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Contractors' Charges

COMPARISON WITH SUPPLY AUTHORITIES

WE welcome the reply from Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association, to a letter from a lady reader comparing the charges of a private contractor with those of an electricity supply authority. The subject is one which should have the utmost publicity at the present time when the livelihood of many electrical contractors may be threatened.

Experience showed that the former electricity supply authorities regarded electrical contractors either as allies in the sale of more and more electricity or as unenterprising people who were retarding development. The latter view was taken largely to justify the setting up of installation departments in competition with private firms and individuals, regardless of the fact that installation work and electricity supply, although complementary, are entirely different businesses.

Considerable Advantages

In undertaking this work, electricity suppliers had a considerable "pull" in their schemes for the hire and hire-purchase of appliances, schemes which have seldom been satisfactorily carried on by contractors. It is obvious that an electricity supply undertaking working on a considerable scale is much more favourably placed in providing or obtaining the heavy finance required for hire and hire-purchase and to provide the necessary maintenance. Nevertheless many of the former undertakings still put out their installation work in connection with the schemes and were apparently satisfied with the results.

The advance of hire and hire-purchase considerably narrowed the domestic field for the smaller contractor, because the number of outright purchasers of cookers and other appliances was progressively reduced. But in spite of this, the continued progress of electricity (due to a great extent to the efforts of the contractors themselves) ensured sufficient work to keep the installation industry going.

Installation Department Policy

Post-war conditions have been unfavourable. Lack of plant and fuel has resulted in discouragement of the expanded use of electricity although its use has continued to expand—going ahead with the brake on. Nationalization of electricity supply has reduced the number of distribution authorities to fifteen (including the North of Scotland Board) and this is resulting in uniformity of practice in each area. This will probably mean that where any substantial part of the former undertakings in an area conducted installation departments the new Board will continue and extend them.

All this would not worry the electrical contractors so much if they were sure that the Electricity Boards' competition was "on the level," i.e., that they took account of all their costs in making out their bills. Assurances of this have been given by the Minister of Fuel and Power and the chairman of the British Electricity Authority and Clause 46(2) of the

1947 Electricity Act provides that the form of the annual statement of accounts "shall be such as to secure the provision of separate information as respects the generation of electricity, the distribution of electricity, and each of the main other activities of the Electricity Board concerned, and to show as far as may be the financial and operating results of each such activity." We hope therefore, with Mr. Penwill, that trading activites will be conducted on normal commercial lines. Then, perhaps, we shall not hear so much about the exorbitant charges of private electrical contractors as compared with those of the electricity supply authorities. But the contractors, too, will have to make sure that their businesses are efficient and economic.

PLAIN SPEAKING

At a Birmingham luncheon last week Mr. H. W. Bosworth, the new chairman of the B.E.A.M.A. Council, spoke out boldly on a point which is too often "soft-pedalled." It is that if our suppliers wish to continue in that role they must buy not only special products from us but our everyday lines. This means that instead of raising barriers which our manufacturers find it difficult or impossible to get over they must actively encourage exports from this country. Mr. Bosworth's remarks applied particularly to the hard-currency countries with whom we are finding it impossible to balance our trade. They have their difficulties too, but they must realize our position. We suppose that the only final solution is the full resumption of multilateral trading.

GEOLOGY AND LIGHTNING

The impending development of heavy industries in the Central African territories will necessarily expand the generation of electricity there and involve the transmission of power over long distances by high power overhead lines. In spite of increasingly rigorous protection afforded to existing power lines, the number of interruptions caused by lightning is still serious. An investigation has, therefore, been made by the Electricity Supply Commission, Southern Rhodesia, into local conditions. The results, published in the *Transactions* of the S.A. Institute of Electrical Engineers, support the theory that geological formation influences the frequency with which lightning storms occur. Some outstanding electrical properties of soils have been determined by measuring their electrolytic capacitance with a resistance-capacity bridge. A method is described of predicting the probability of interruption of supply, so helping route selection to minimize lightning effects. In Rhodesia, where atmospheric storms are believed to be at least as severe as in any other part of the world, the old policy of routing power lines otherwise than with full regard for their vulnerability to lightning might mean heavy over-insulation with expensive shielding and earthing arrangements.

U.S. FARM SUPPLIES

Mr. F. E. Rowland's I.E.E. Lecture last week (reported on page 809) showed that where agricultural conditions in Great Britain are similar to those in the United States, electrification practice is certainly not behind. Comparisons are likely to favour this country in the future. The 5 kVA and 7 kVA transformers installed on average American farms, presumably with networks to match, seem to us based on an unduly optimistic view of diversity of demand of farm and farmhouse, even allowing for heavier overloading permissible in extremely cold weather during winter peaks. The normal provision here of 20 to 25 kVA will no doubt make less probable a need for early reinforcement of supply arrangements with ultimate enonomy.

THE OVER-FORTIES

We have had a letter from the wife of a former supervising electrical engineer who has been unable to find a job because he has reached the age of forty-eight. This is a constantly recurring complaint in spite of the obvious need for men of experience who still possess all their faculties. The matter is raised in the latest I.E.E. annual report in references to the Technical and Scientific Register and the Professional Engineers' Appointments Bureau. In both cases it is said that difficulty is being experienced in placing men of over forty-five, and an appeal is made to employers to avoid, wherever possible, specifying low maximum age limits.

Super-voltage Power Cables

Survey of Available Designs

By C. C. BARNES, A.M.I.E.E., A.I.I.A.

NOMENCLATURE relating to cables for voltages above 22 kV (super-voltage cables) has been found confusing by many engineers.[1] Reviewing briefly the various available types shows that for 33 kV systems the most widely used are single- and three-core screened solid-type cables[2] consisting of copper conductors, insulated with oil-impregnated paper tapes, wrapped with a paper-backed aluminium screen or copper tape and then sheathed with a tube of lead or lead alloy. In recent years many of the former supply undertakings adopted the "C.M.A. New Standards" summarized in Table I. In computing the maximum stress, the use of circular conductors without correction for conductor stranding has been assumed.

At 66 kV the large dimensions and weight of three-core cables of the solid type and their comparatively low current rating have caused them to be largely replaced by other designs. Screened single-core cables of that type and voltage have a minimum dielectric thickness of 0.65in (radial) for the normal range of copper sections, that is, 0.20 to 0.75 sq in (equivalent to 43.9 kV/cm for 0.20 sq in). On three-phase svstems 66 kV represents the upper limit of voltage for solid-type cables, as above that voltage level tests have shown that failures occur due to ionization in voids or gas pockets within the dielectric.

These voids are the result of the bending of the cable during processing or installation, expansion and contraction with varying loading cycles or overheating, which causes the impregnating compound to expand, thereby exerting a pressure inside the cable which tends permanently to distort the lead sheath. The voids or low-pressure spaces which are formed by the contraction of the compound on cooling ionize readily, since, owing to their lower permittivity, the stress within them is three or four times that in the solid dielectric, thus greatly lowering breakdown strength of the cable.

The inhibition or suppression of these voids, however, enables the electric stress to be raised to a very much higher value (thereby conserving materials and reducing the cable price without endangering the performance of the dielectric). Elimination of voids is achieved in three ways: By the use of low-viscosity mineral oil under continuous pressure for impregnating the dielectric and the inclusion of oil channels within, or adjacent to, the insulated cores; by the application of external pressure to a solid-type cable, the pressure medium being separated from the oil-impregnated paper dielectric by a flexible impermeable diaphragm (a lead or polyethylene sheath); by the introduction of an inert gas at high pressure within the lead sheath and in direct contact with the dielectric.

The first complete attempt to obviate ionization under all load conditions was

SUPER VOLTAGE POWER CABLES

TABLE I.—Minimum Dielectric Thicknesses for 33 kV Screened Cables (Centre-point-earthed systems only)

Nominal Conductor Area sq in	Minimum Dielectric Thickness		Maximum Electric Stress (Circular Conductors) kV/cm	
	3-core screened & 3-core SL, in	Single-core screened, in	3-core screened & 3-core SL	Single-core screened
0.10	0.315	0.335	39	37.7
0.15	0.300	0.325	37.9	35.9
0.20	0.300	0.325	36.4	34.4
0.25	0.280	0.300	37.0	35.3
0.30	0.280	0.300	36.2	34.3
0.40	0.280	0.300	35.0	33.2
0.50	0.280	0.300	34.5	32.5
0.60	—	0.300	—	31.8
0.75	—	0.300	—	31.0
1.00	—	0.300	—	30.5

made by Emanueli with his oil-duct cable,[3] and the first installation of this kind to work successfully at 132 kV was a short length laid in 1924 at Burghero (Italy). The use of gas pressure for suppressing ionization was first suggested in 1925 by Fisher and Atkinson. A year

later Hochstadter patented the application of pressure through a flexible diaphragm, which is the basis of the compression cable.

These developments have enabled British manufacturers to offer various designs (Fig. 1) of cable using oil or gas under pressure. Although these designs were intended primarily for operation at 132 kV or higher voltages, they are being increasingly used for 66 and 33 kV on account of their economy on long cable routes. The reduction of radial thickness of paper insulation obtained through the pressure principle is shown in Table II.

The main characteristic of commercial gas- and oil-filled cables are indicated below. The nominal gas pressure is in all cases 200 lb/sq in, and the hydrostatic oil pressure about 50 lb/sq in (maximum). The compression cable, in which the gas is separated from the oil-impregnated dielectric by a diaphragm lead sheath, has a nominal dielectric thermal resistivity of 500° C/watt/cm and a design stress of 70 to 110 kV/cm; it is available for 33 kV and 66 kV in single- and three-core self-contained or pipeline constructions, and for 132 kV in self-contained form for single-core and in pipe-line for three-core construction.

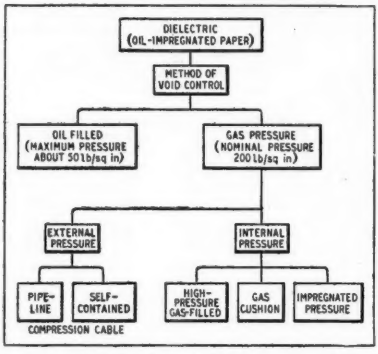

Fig. 1.—Classification of British super-voltage power cables

In the high-pressure gas-filled cable the conductors are passed through smoothing dies to provide a flat bed for the metallized screening papers applied over the strands. The dielectric (with which nitrogen is in direct contact) is built up from pre-impregnated paper tapes; its nominal thermal resistivity is 700° C/watt/cm, and it is stressed up to 85 kV/cm. It is available for 33 and 66 kV as a single- or three-core construction, and for 132 kV as a single-core cable.

TABLE II.—Comparative Insulation-wall Thicknesses

Operating Voltage kV	Nominal Area of Conductor sq in	Minimum Radial Thickness of Insulation		
		Screened solid-type cable	Oil-filled cable	Gas-filled (impregnated pressure)
33	0.30	0.28 (3-core)	0.16 (3-core)	0.10 (3-core)
66	0.30	0.65 (single core)	0.25 (3-core)	0.20 (3-core)
132	0.30	—	0.53 (single-core) 0.47in ID duct	0.47 (single- or 3-core)

With the impregnated-pressure and gas-cushion designs, nitrogen is likewise in contact with the dielectric, which has a nominal thermal resistivity of 550°C/watt/cm in the former case and 650 in the latter, the corresponding design stresses being up to 100 kV/cm and up to 85 kV/cm respectively. Both are made in either single- or three-core construction for 33 and 66 kV and single-core for 132 kV, but the impregnated-pressure type has also been supplied as a three-core cable for 132 kV service.

For the oil-filled cable the paper dielectric has greater porosity than that generally used. The longitudinal channels for the low-viscosity impregnating oil are in the conductors of single-core cables for all voltages and in the core interstices of three-core cables for 33 and 66 kV only. The nominal dielectric thermal resistivity is 500° C/watt/cm and a design stress up to 90 kV/cm is used.

The increase in the maximum permissible electric stress due to the use of gas at high pressure has the following advantages. Reduction of the dielectric wall thickness results in a smaller and lighter cable for a specified load, and thus extends the sphere of the three-core cable; it also lowers the thermal resistance, thus permitting an increased current loading. The application of pressure to the dielectric controls the effects of heating cycles and allows of a much higher

conductor temperature than is permitted for screened solid-type cables. The above advantages apply equally to the oil-filled cable.

Maximum conductor temperatures prescribed for screened solid-type cables are from 60 to 65° C, except when unarmoured cables are pulled into ducts, for which case the maximum conductor temperature permitted is 50° C. These figures compare with 80° C for the compression, high-pressure gas-filled and gas-cushion designs, and 85° C for impregnated pressure and oil-filled designs for all methods of installation (assuming a ground temperature of 15° C or an ambient-air temperature of 25° C). Table III compares current rates [4 5] for one three-phase circuit consisting of (a) 33 kV screened solid-type armoured three-core cable, (b) 66 kV solid-type single-core cables in trefoil formation (circular conductors), (c) 66 kV oil-filled three-core cables with rubber-sandwich finish, (d) 66 kV impregnated-pressure three-core cable with rubber-sandwich finish, (e) 132 kV oil-filled single-core cables with rubber-sandwich finish (in trefoil formation), and (f) 132 kV three-core S.L. type pipe-line compression cable. Expressed

0.2 per cent antimony) to BS.801-1938 is widely used, while Alloy B (0.85 per cent antimony) is recommended where vibration is severe. Metallic reinforcement of oil-filled and gas cables is necessary to prevent undue distension of the sheath in service, and ultimately to take the strain when the sheath has expanded in close contact with it. For three-core cables tinned steel has the merits of strength and cheapness, but for single-core cables non-magnetic materials, such as brass or silicon-bronze tape, are necessary.

For protecting reinforcing tapes from corrosion, either a second lead sheath is applied and wrapped overall with textile tapes well coated with heavy layers of bituminous compound (D.L.S. and served) or else layers of proofed cotton and rubber tapes are used with a final wrapping of one or two bituminous-compounded hessian tapes (S.L.S. and rubber protection). The D.L.S. construction results in a heavier and more expensive cable, and sheath losses are greater than with the S.L.S. design, but the annular inter-sheath space can be used for gas-leak location, and if the outer sheath is mechanically damaged a warning is provided before the damage to the cable

TABLE III.—Current Rating [4 5] For Various Designs of Super-voltage Cables Buried Direct.

Conductor Area	(a) 33 kV three-core solid-type	(b) 66 kV single-core solid-type	(c) 66 kV three-core oil-filled	(d) 66 kV three-core Impregnated Pressure	(e) 132 kV single-core oil-filled	(f) 132 kV three-core S.L. pipe-line compression
Sq in	Amp	Amp	Amp	Amp	Amp	Amp
0.06	150	—	—	—	—	—
0.10	200	—	240	225	250	—
0.15	245	—	290	275	305	—
0.20	285	275	340	325	355	310
0.25	320	310	390	370	390	350
0.30	355	345	430	410	425	385
0.40	410	400	505	475	490	440
0.50	450	440	560	525	540	480
0.60	—	480	605	570	580	—
0.75	—	520	—	—	635	—
1.00	—	—	—	—	695	—

in MVA, the rated loading of a 0.2 sq in conductor cable would be: (a) 16.3, (b) 31.4, (c) 38.8, (d) 37.1, (e) 81.0, and (f) 70.9. For 0.4 sq in conductors, the MVA would be: (a) 23.4, (b) 45.6, (c) 57.6, (d) 54.2, (e) 112.0 and (f) 100.4 All cables are assumed to be buried direct in the ground at standard depth of laying.

As an alternative to the so-called pure lead sheath, Alloy E (0.4 per cent tin, becomes more extensive. The S.L.S. rubber-protected type of cable is more easily and cheaply installed, and is well protected against corrosion by the rubber-bitumen tapes.

The saving in lead with the S.L.S. design has been indicated by figures compiled by D. T. Hollingsworth[1]. The length of three-phase cable per 1,000 tons of lead when transmitting 20 MVA at 33 kV

is 7.2 miles for solid cable, 7.1 miles for gas-cushion cable with two lead sheaths, and 13.4 miles for impregnated-pressure cable with one lead sheath. When transmitting 40 MVA at 66 kV, the corresponding mileages become 3.2, 5.0 and 9.8. Gas-cushion cable is also available, however, with S.L.S. rubber-sandwich protection.

In the compression cable[6] the paper-insulated conductor, sheathed with a thin lead diaphragm (which is subject to external gas pressure), is placed inside a container, which takes two forms. In the first it consists of a thin steel pipe having an internal diameter about one inch in excess of the cable overall diameter. This steel pipe, in lengths of 30 to 40ft, is welded together on site and a coating of anti-corrosive material is applied. The cable is drawn in after the pipe-line has been installed and tested for gas tightness. During the London "blitz" a pipe-line compression cable was practically undisturbed by a bomb which fell a few feet away and destroyed other high-voltage cables in the same group; the only effect on the pipe-line was a slight movement and a dent. After examination, this pipe-line cable was put in service immediately to carry the whole load until the others could be repaired.

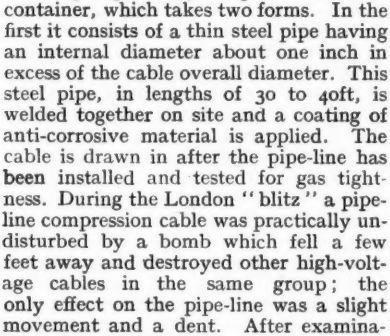

Fig. 2.—Construction of Mollerhoj oil-filled cable
A. Tinned copper wire. B. Graded paper insulation. C. Metallized screening. D. Lead sheath. E. Bitumenized crêpe paper and cloth. F. Brass tap. G. Corrugated tape and binding wire. H. Served overall

The second, or self-contained, type of container comprises a circular "pressure-retaining" lead sheath of normal thickness, which is reinforced with two metal tapes and layers of bitumenized paper. Corrosion-resisting covering over the reinforcement can be provided by a third lead sheath or by the "rubber sandwich" protection referred to above.

American Practice

In the United States one company[7] designs its gas pressure system according to the operating voltage, that is, 10 to 15 lb/sq in for 10 to 40 kV, 24 to 40 lb for 40 to 69 kV, and 150 to 200 lb for 69 to 138 kV. Greater use is made of gas cables operating at less than 40 kV than in Britain, apparently because the smaller diameter gas cable makes better use of the ducts into which most power cables are drawn there. A bronze-reinforced plastic sheath has recently been used in the United States instead of a diaphragm lead sheath over the individual paper-insulated cores of compression cables.

Recent Continental Developments

In the last few years on the European continent there have been developments in both compression and oil-filled cables. A self-contained oil-filled cable operating without external oil reservoirs was suggested by Mollerhoj[8] in 1939, the fluid oil being under a pressure of about 50 lb/sq in. With the Mollerhoj cable the insulated and screened cores are not twisted together, but are laid side by side and lead-covered with their axes in one plane (Fig. 2). Over the lead sheath is a compounded paper or cotton tape, followed by two corrugated bronze tapes applied longitudinally over the major axis and secured by spirals of hard-drawn copper wire bedded into the corrugations. This reinforcement is protected from corrosion by well compounded textile servings. This design, it is claimed, permits high current loadings owing to the relatively large cooling surface, while the maximum stress and temperatures are similar to those of the conventional design of oil-filled cable. Expansion of the dielectric on load is compensated for radially, so that oil-feeding is unnecessary and a given minimum (positive) pressure can be obtained during cooling. Separate impregnation of the individual cores and assembly during the sheathing

North American Rural Practice

IMPRESSIONS FROM A RECENT TOUR

IN a lecture delivered before the Institution of Electrical Engineers in London last week, MR. F. E. ROWLAND (G.E.C.) gave his impressions of agricultural and horticultural electrification practice in North America, where during the late summer and early autumn of 1948 he travelled over a wide area in the United States and Canada. The applications described, however, were not necessarily suitable to conditions in this country and it was not possible to compare British and American practice.

In the U.S.A. the Rural Electrification Administration (R.E.A.) is an agency of the Government Department of Agriculture which makes loans bearing 2 per cent interest, self-liquidating and repayable over a maximum period of 35 years. It is virtually a Government subsidy. More than 95 per cent of the loans have been made to "Co-operatives," local independent business enterprises organized under State laws which are controlled by their consumer members. The form of tariff almost universally encountered is of the block type, with a high cost for an initial number of kWh, which becomes progressively lower until the minimum is reached.

Visitors from this country to North America sometimes report that farm electrification is much more advanced there than here. This cannot be substantiated, and in many respects Britain is in the lead. A typical service of the Atlantic City Electric Co. has a 7.5 kVA transformer, which is considered large, with a total connected load of 20.5 kW made up of 10.4 kW for the house and 10.1 kW for the farm.

V.i.r. wiring is widely employed, but it is losing favour because when the temperature falls to 10 deg F below zero the braiding perishes due to condensation. Polychloroprene or neoprene is being offered as an alternative. Aluminium alloy conduit is also employed, particularly in California. Ironclad switchgear is supplied in sheet steel cases which would not be accepted in Britain, but they appear to wear satisfactorily.

Thermostatically controlled exhaust fans associated with vertical ducts on the walls are used in cowsheds and stables, so that in winter air is drawn from floor level where it is coldest and in summer hot air is taken from the ceiling.

The standards of hygiene for milk production for the wholesale market are generally lower than British "Accredited" standards, although the methods of producer-retailers, some of whom operate on a large scale with herds of over 100 cows, are comparable. In California, water storage steam raisers and electric dairy sterilizing chests are widely used. The latter work on the semi-dry principle, which does not provide for external steaming for milking clusters. Sterilizing requirements are of the order of 180 deg F for 20 minutes. During 1937-38 the California Committee on the Relation of Electricity to Agriculture conducted a study of energy consumption of electrically operated dairy farm equipment. Records were kept on twenty farms, with herds ranging from 30 to 150 cows, the average consumption being 15 kWh to 18 kWh per cow per month.

The fundamental idea underlying barn hay drying was initiated in Britain and during the past ten years its use has spread to many parts of the United States. Axial flow fans are usually employed, the largest one encountered being 10 h.p. 60in, which dries a load of 100 tons at a time. Experiments have been made with supplementary heating in the extreme South on account of the long growing season and high humidity. In the North, where heating has also been used, the season is short and there is a heavy rainfall.

Super Voltage Power Cables

(*Continued from preceding page*)

process facilitates production in long sections. The cores are transposed at the joints to minimize sheath losses.

British cables of the designs described have given good service, but there is still considerable opportunity for reducing the number of associated accessories.

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For frost protection some farms use electrically driven wind machines. A typical one incorporates a 75 h.p. motor, which is rated at 125 h.p. due to the overloading which is possible when it is running in the slipstream of the propeller at an ambient temperature of 32 deg F. Trials have been made with electric radiant heating, which is less effective than oil heaters and more expensive, and until more experience has been gained it is impossible to assess its practical value.

In North America the technique for incubating and brooding is similar to ours and automatic egg-turning is widely practised. Experiments are being made with floor heating for brooding, and by this means it is hoped to keep the litter dry with the possibility of not having to replace it during the season.

Soil warming is used extensively, but not usually during the normal growing period. Comparatively high loadings with thermostatic control are employed, and doubt is expressed whether off-peak or the "dosage" system will suit conditions where very wide temperature fluctuations are experienced. Results of tests on plant irradiation show that tungsten and fluorescent lamps are the only ones which produce reasonably satisfactory growth. On the whole, an entirely satisfactory source of artificial radiant energy is not yet available, but the fluorescent sources appear to meet present requirements for general experimental work

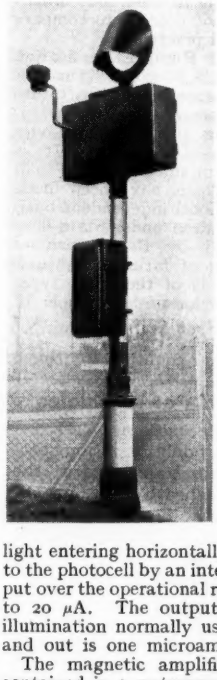
Farm Electricity in U.S.A.

AT a National Farm Electrification Conference in Chicago, according to a report in *Electrical Construction and Maintenance*, it was stated that there are now over 4,000,000 farms electrified, compared with 393,000 in 1927 and a predicted total of 5,400,000 in 1957 (there are approximately 6,000,000 farms in the United States). It was considered that during the next ten years the average power consumption per farm would approach 4,000 to 5,000 kWh annually. During this decade farmers would, it was estimated, invest $4,000,000,000 in electrically operated home appliances and $1,350,000,000 for electrical components, not including the cost of the machines.

Research was constantly developing new farm production processes requiring electrical energy, and it was predicted that within the next five or six years crop-conditioning units—such as artificial corn dryers—would become common farm equipment. Also being investigated were the possibilities of using high-frequency radiation to pasteurize and homogenize milk in a single operation, to control enzymatic action in grains and to control bacteria in eggs.

Street Lighting Control

AN automatic control device for public lighting systems which is being made by Elliott Brothers (London), Ltd., Century Works, Lewisham, London, S.E.13, uses a barrier layer photocell in conjunction with a magnetic amplifier, obviating the need for routine servicing. It has been tested by the Eastern Electricity Board, to control discharge lamps in Wembley High Street and the lighting at the Fryent Way roundabout, Wembley. The switching "on" and "off" conformed closely to legal lighting-up times, but with the added advantage of earlier illumination in foggy or overcast weather.



Elliott magnetic amplifier control unit fitted to a traffic sign with photocell top left

The photocell is intended for mounting near the top of a lamp standard, and has a "Perspex" window covered by a metal plate to screen the element from direct sunlight, light entering horizontally being reflected on to the photocell by an internal cone. The output over the operational range varies from 0.5 to 20 μA. The output for the degree of illumination normally used for switching in and out is one microamp.

The magnetic amplifier control unit is contained in a waterproof case and may be mounted on a lamp standard or in any other convenient position. The amplifier itself has an input resistance of about 2 kΩ to match the impedance of the photocell, is capable of operating on an input of 0.5 μA and provides amplification for input currents over the range 0 to 20 μA. Its output energizes a relay with a mercury switch and is capable of handling lighting loads of up to 2.5 kW. The operation of the controller is virtually unaffected by normal fluctuations in mains voltage, and while it is designed for lighting loads of 10 A at 250 V 50 c/s it will withstand starting overloads of discharge lamps without difficulty.

Views on the News

By REFLECTOR

A CANADIAN expressed surprise to me the other day at the lack of salesmanship displayed by some electrical retailers here. He says he finds that they are willing to sell a yard or two of three-core flex to customers without any effort to do more. In North America the storekeeper would be almost certain to sell a connector and plug, too, all ready for use. He agreed that the variety of plugs in use here made the business less simple, but he still thought that the sale of a complete connection should be tried. The attachment of a connector and plug to a length of flex is certainly a job that many would rather not undertake, and by the time the flex is worn out the accessories must be in a pretty bad state.

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Manufacturers of appliances complain that they last too long. People will not normally replace them until they are thoroughly worn out, and to thoroughly wear out a cooker, say, takes a very long time. And yet the makers must not reduce the quality. Moreover, the electricity authorities had to allow their hire-purchase schemes to run down and lapse. Now I am pleased to see a move on the part of one of the Electricity Boards (the Eastern) to encourage consumers to exchange their old cookers for more modern types. In its advertisements the Board says: "Easy to Buy—From 1s 8d a Week; Many Different Models."

★ ★ ★

Purchase tax on domestic immersion heaters has always been a source of trouble to the Customs and Excise authorities. Originally the tax was levied only on apparatus with a loading of more than 3 kW. As might have been expected, enterprising manufacturers were not slow in producing equipment of just over this figure, generally about 3¼ kW. The Customs and Excise authorities countered by raising the loading at which the apparatus became tax free to 4 kW. As I pointed out at the time, this higher loading was, if anything, an advantage to the user, though the supply authorities might not find it so welcome. This objection is, however, overcome by the latest move of one manufacturer at least who is now producing 4 kW units with 3 kW tappings. It will be interesting to see what the next move is. Let us hope it will be the only really satisfactory one, namely the removal of the tax altogether. The ostensible object of discouraging sales of the apparatus so as to restrict electricity consumption was never a really convincing one, the water-heating load being so very largely off-peak.

★ ★ ★

One of the causes of the strike in the Lancashire coalfield was the withdrawal of the "concessionary" coal which the miners received under the former régime. Something of this kind has prevailed here and there in the electricity supply industry and this is one of the minor difficulties which the B.E.A. has to meet. I believe it has been suggested that the concessions should be commuted into cash, the allowance being purely "personal" to those already enjoying privileges; their successors would not inherit the allowance.

★ ★ ★

There have been complaints that local government officials are being attracted by larger salaries to the service of the nationalized industries. In this connection an unusual case is reported from a London borough. The borough council having lost the services of an accountant who took up a job with the British Electricity Authority advertised the vacant position. Among the replies was one from its former employee who was looked on so favourably by the responsible committee that it recommended the council to re-appoint him with a substantial increase in salary.

★ ★ ★

At the hearing of charges at Birmingham against a man for keeping a common gaming house it was stated that an "Electric Exchange" slot machine was in operation. The prosecuting solicitor said that in certain circumstances it was possible to win threepence or sixpence, but in most cases the penny was lost. This seems to provide an idea for a new form of prepayment meter.

Impedance Network Analysis

Graphical Solution of Unbalanced Star System

By W. M. MACKAY, M.C., T.D., B.Sc., Dipl. R.T.C., M.I.E.E.

GRAPHICAL methods of analysing an unbalanced three phase star network of impedances have been published.[1 2 3] A neat and comprehensive procedure is based on the analogy existing between a system of vector voltages with admittances and the *radii vectores* of a system of masses. This analogy was applied by M. B. Field[4] to obtain the neutral potential of a three-phase system with leakage conductances. It has also been employed in the design of rotor starting resistances for induction motors.[5] It is here extended to apply to complex impedances forming an unbalanced star.

Let $\mathbf{E}_{OA}$, $\mathbf{E}_{OB}$, $\mathbf{E}_{OC}$ be the phase voltage vectors of a three-phase supply system, measured from any reference point O (conveniently, but not necessarily, the supply neutral). Let S be the star point of three impedances, $\mathbf{Z}_1$, $\mathbf{Z}_2$, $\mathbf{Z}_3$ connected to lines A, B, C respectively, the phase rotation being A B C. Then $\mathbf{Y}_1$, $\mathbf{Y}_2$, $\mathbf{Y}_3$ are the corresponding admittances ($\mathbf{Y}_1 = 1/\mathbf{Z}_1$, etc.).

From the fact that the three phase currents sum to zero,

$$\mathbf{E}_{OS} = \frac{\mathbf{E}_{OA}\,\mathbf{Y}_1 + \mathbf{E}_{OB}\,\mathbf{Y}_2 + \mathbf{E}_{OC}\,\mathbf{Y}_3}{\mathbf{Y}_1 + \mathbf{Y}_2 + \mathbf{Y}_3} \quad \ldots(1)$$

If the admittances are pure conductances ($G_1 = \frac{1}{R_1}$, etc.) the expression becomes $\mathbf{E}_{OS} = \frac{\Sigma \mathbf{E}_p G}{\Sigma G}$, where $\mathbf{E}_p$ stands for any phase voltage vector and G for the corresponding conductance. This is exactly analogous to the expression $\frac{\Sigma r\, m}{\Sigma m}$ for the radius vector of the centre of mass of masses m_1, m_2, etc., at radii $\mathbf{r}_1$, $\mathbf{r}_2$, etc.

For example, if resistances of 6, 3 and 2 ohms are star-connected to the terminals A B C, the admittances are then conductances of 1/6, 1/3 and 1/2 mho, proportional to 1, 2 and 3. The centre of gravity (c.g.) of weights of 1, 2 and 3 units at A, B and C is at S (Fig. 1) and OS is accordingly the voltage unbalance of the star point; SA, SB and SC are the voltages across the respective phase impedances.

If the **Y** values in eqn. (1) are all of the same power factor (all of $\underline{/\theta}$), operating on numerator and denominator by $\underline{/-\theta}$ will reduce the expression to the form applicable to conductances. The method of Fig. 1 applies therefore to three inductors or three capacitors or to any three loads of the same power factor.

If the phase angles are different, let the admittances be $\mathbf{Y}_1 = Y_1\underline{/\alpha_1}$, $\mathbf{Y}_2 = Y_2\underline{/\alpha_2}$ and $\mathbf{Y}_3 = Y_3\underline{/\alpha_3}$. In order to apply the c.g. method, transfer the angles α_1, α_2, α_3 of the admittances in the numerator of eqn. (1) to the corresponding phase-voltage vectors, leaving the Y values as scalar quantities. Multiply and divide the whole equation by Σ Y (scalar sum). The equation then becomes

$$\mathbf{E}_{OS} = \frac{(\mathbf{E}_{OA}\underline{/\alpha_1})\,Y_1 + (\mathbf{E}_{OB}\underline{/\alpha_2})\,Y_2 + (\mathbf{E}_{OC}\underline{/\alpha_3})\,Y_3}{\Sigma\,Y\ \text{(scalar sum)}} \times \frac{\Sigma\,Y\ \text{(scalar)}}{\Sigma\mathbf{Y}\ \text{(vector)}} \quad (2)$$

For example, let $\mathbf{Z}_1 = 1\underline{/30°}$, $\mathbf{Z}_2 = 0.5\underline{/-20°}$, $\mathbf{Z}_3 = 0.33\underline{/-50°}$

giving $\mathbf{Y}_1 = 1\underline{/-30°}$, $\mathbf{Y}_2 = 2\underline{/20°}$, $\mathbf{Y}_3 = 3\underline{/50°}$.

$$\text{Then } \mathbf{E}_{OS} = \frac{(E_p\underline{/0° - 30°})Y_1 + (E_p\underline{/-120° + 20°})Y_2 + (E_p\underline{/120° + 50°})Y_3}{\Sigma\,Y} \times \frac{\Sigma\,Y}{\Sigma\mathbf{Y}}$$

$$= \frac{(\mathbf{OA}^1)\,Y_1 + (\mathbf{OB}^1)\,Y_2 + (\mathbf{OC}^1)\,Y_3}{\Sigma\,Y} \times \frac{\Sigma\,Y}{\Sigma\mathbf{Y}}$$

Place weights of 1, 2 and 3 units at A′, B′ and C′ respectively and find M their c.g. The scalar sum of the admittances is O′D and their vector sum (Fig. 4) is **O′V** ($= k\underline{/\alpha}$. O′D). Make O′M′ equal to

OM, and draw M'S' parallel to VD. Construct triangle OMS equal to triangle O'M'S'. Then S is the potential of the star-point, and SA, SB and SC are the required phase voltages.

The supply voltages may be unbalanced in any way and O may be any reference point. For example, if the reference point be taken at B and the equation 2

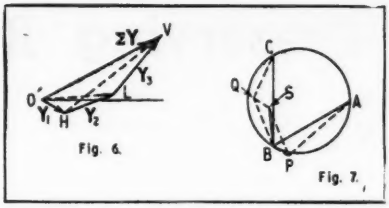


Fig. 6. Fig. 7.

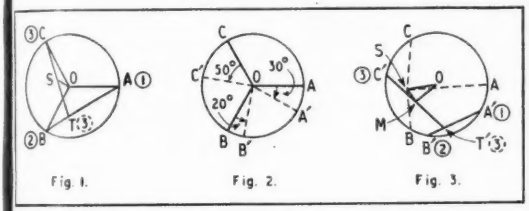


Fig. 1. Fig. 2. Fig. 3.

multiplied by $/\underline{-\alpha}$ (by $/\underline{-28°}$ in this case) then

$$\mathbf{E_{BS}} = \frac{(\mathbf{E_{BA}}/\underline{-30°-28°})\,Y_1 + E_{BB}\,Y_2 + (\mathbf{E_{BC}}/\underline{50°-28°})\,Y_3}{\Sigma Y} \times \frac{\Sigma Y}{\Sigma \mathbf{Y}/\underline{-28°}}$$

$$= \frac{(\mathbf{OA''})\,Y_1 + (\mathbf{OC''})\,Y_3}{\Sigma Y} \times \frac{O'D}{O'F}$$

The first term is obtained by placing weights of 1, 2 and 3 units at A'', B and C'' respectively and finding N their c.g. (Fig. 5). BN is then extended in the ratio O'D/O'F, or 1/k, to BS. Thus S is the star point potential.

In these methods, Fig. 4 can often be dispensed with since the ratio $\Sigma Y/\Sigma \mathbf{Y}$ is usually readily available from the algebraic values of **Y**. The time to solve is

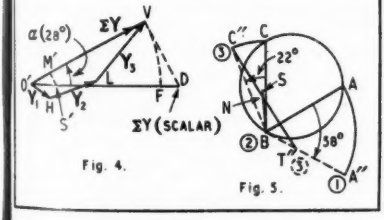


Fig. 4. Fig. 5.

thus approximately halved, since only the voltage vector diagram need be drawn.

Dr. Tasny-Tschiassny's method of solution[2] using conjugate admittance values may be employed equally well with actual admittance values, and so with less risk of angle errors. Taking B as reference point, eqn. (1) is written

$$\mathbf{E_{BS}} = \mathbf{E_{BA}}\frac{\mathbf{Y}_1}{\Sigma \mathbf{Y}} + \mathbf{E_{BC}}\frac{\mathbf{Y}_3}{\Sigma \mathbf{Y}}$$

$$= \mathbf{E_{BA}}\frac{\mathbf{O'H}}{\mathbf{O'V}} + \mathbf{E_{BC}}\frac{\mathbf{LV}}{\mathbf{O'V}}$$

$$= \mathbf{BA}\frac{\mathbf{O'H}}{\mathbf{O'V}} + \mathbf{BC}\frac{\mathbf{VL}}{\mathbf{VO'}}$$

Construct triangle ABP similar to triangle VO'H and triangle CBQ similar to triangle O'VL so that $\mathbf{E_{BS}} = \mathbf{BP} + \mathbf{BQ} = \mathbf{BS}$ (Figs. 6 and 7).

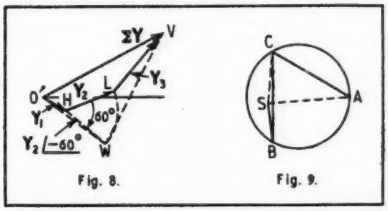


Fig. 8. Fig. 9.

If the line voltages are balanced, a method very easy to apply is the following, using C in this case as the reference point.

$$\mathbf{E_{CS}} = \frac{\mathbf{E_{CA}}\,Y_1 + \mathbf{E_{CB}}\,Y_2}{\Sigma Y}$$

$$= \frac{\mathbf{E_{CA}}\,Y_1 + \mathbf{E_{CA}}/\underline{-60°}\,Y_2}{\Sigma \mathbf{Y}}$$

$$= \mathbf{E_{CA}}\frac{\mathbf{Y}_1 + \mathbf{Y}_2/\underline{-60°}}{\Sigma \mathbf{Y}}$$

Swing the $\mathbf{Y}_2$ vector in Fig. 8 through $-60°$ from HL to position HW so that

(*Concluded at foot of next page*)

Preserving Rural England

ELECTRICITY AND AMENITIES

A SECTION of the annual report for 1948-49 of the Council for the Preservation of Rural England is devoted to "Electricity Distribution and Works." It is said that contact has been established with the British Electricity Authority and that Authority's officials are assisting the C.P.R.E. in the revision of the Council's "Memorandum of Policy and Procedure in regard to Electricity Distribution and Works" so as to bring it up to date in accordance with the new organization and arrangements.

At present, says the report, there appears to be little prospect of general underground distribution. "This is disappointing because the Electricity Act appears to provide for this and to make it clear that the 'paying areas' (i.e., the thickly populated areas) are intended to assist in financing distribution to the scattered areas." It is considered reasonable that townspeople who go to see the beauty of the scenery should contribute towards the cost in this manner.

There is also the question of putting underground or re-aligning those of the transmission lines which most seriously deface the landscape, as suggested by the Hobhouse Committee on National Parks. Under the Act of 1947 such measures are within the power of the local planning authority but entail the payment of compensation. This liability should become a national charge in so far as national parks are concerned.

Reference is also made to the siting of power stations. The Council says that before any new station is sanctioned the local authorities concerned and the owners and occupiers in the vicinity are notified. If any of them are dissatisfied they can always invite the co-operation of the Council which is prepared to investigate every case on its merits from the point of view of landscape disfigurement.

A number of cases are quoted in which the Council has been involved during the past year. It is understood that the B.E.A.'s proposal to encroach upon Sheffield's green belt by the erection of a high voltage line from Staythorpe to Oughtibridge has been abandoned. An application for consent to the erection of a power station at Hill Wootton (Warwickshire) was withdrawn as "premature." The Council says that in view of the fact that the preservation of the landscape in the area is of national interest any renewal of the application ought to be out of the question.

In the case of lines from Cliff Quay (Ipswich) power station, the Council was informed by the B.E.A. that the siting of the lines had been fully considered by the local authorities and local planning authorities concerned.

Proposals put forward by the Council with regard to the design of the entrance portals of the new Woodhead tunnel on the Sheffield-Manchester electrified line and the disposal of the spoil were accepted by the Railway Executive.

Referring to atmospheric pollution by power stations, the report particularly mentions Meaford and says that the Department of Scientific and Industrial Research is trying to find methods of removal of sulphur which would be less costly and troublesome than those at present in use.

The proposed generating station at Marchwood, on Southampton Water, has been the subject of investigation and representation by the Council, and the Lancashire Board has investigated similar proposals in the Fylde area.

Other matters included in the report are the erection of wireless installations (police and Ministry of Civil Aviation) and Post Office overhead lines in rural districts. There is also a passing reference to the B.E.A.'s proposals for a hydro-electric scheme in North Wales, which is described as the "most recent and potentially most damaging" of all the threats to possible National Park areas.

Impedance Network Analysis

(Continued from preceding page)

$E_{CS} = E_{CA} \frac{O'W}{O'V}$. Construct triangle ACS (Fig. 9) similar to triangle VO'W. Then SA, SB and SC are the required phase voltages.

REFERENCES.

1 Electric Currents, La Cour and Bragstad, 1913, p. 262. Longmans.

2 Unbalanced Impedance Star Network, Dr. E. Wilkinson, *Elec. Rev.*, 31st Oct., 1947.

3 A.C. Network Analysis II, Dr. L. Tasny-Tschiassny, *Elec. Rev.*, 26th Dec., 1947.

4 Potential of Partly Insulated Systems in relation to the Potential of Earth, M. B. Field, *Journal I.E.E.*, Vol. 41, 1908.

5 Electric Motor Starters, Appendix, J. Anderson, *Journal I.E.E.*, Vol. 60, 1922.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Charges for Electrical Work

MAY I be allowed to comment upon the letter from Mrs. Woollett published in your issue of 22nd April?

I do not know the name of the private contractor called in by your correspondent, but I would agree that the reputable firm does not normally demand "cash on delivery." Members of the Electrical Contractors' Association usually render accounts, even for jobbing work, in which category this type of work is included. However, here the remedy is in the customer's hands.

But that is by the way. First, a charge of 10s 6d in 1947 was not unduly high for a thorough inspection which culminated in the replacement of various fuses. (Half an hour seems little enough, and twenty minutes a practical impossibility for such a job, but let the statement go). In fact, in view of Mrs. Woollett's statement that, in addition to the work on the spot, a total of four miles' travel was involved, she seems to have received remarkably cheap service. And, as is remarked, the private contractor came when he was asked to come: the customer did not have to wait until she was scheduled for attention.

I am more concerned, however, with the general comparison made by your correspondent between the charges of electrical contractors and those of supply authorities. She makes a mistake which is all too common, i.e., she accepts without question that the often ridiculously low charges made by supply authorities must of necessity be fair and reasonable, and she judges others by that standard. The truth is that the private contractor's charges almost invariably bear a very close relationship to the real cost of the job. This for the reason that he has to include *all* his costs in his charges —materials, labour, overheads, and a modicum of profit; whereas—tell it not in Gath—it has not been unknown for supply authorities not only to ignore little things like overhead charges (office, showrooms, transport, etc.), but even to make arrangements to subsidize the euphemistically described "consumer services" from other sources.

I say "has not": I trust that these unfair practices will cease. My Association has received assurances from the Minister of Fuel and Power and from the chairman of the British Electricity Authority, that the Authority will conduct its trading activities on normal commercial lines; in addition there are certain "safeguards" in the Electricity Act of 1947 which are supposed to ensure that the Authority's trading accounts stand alone.

It is greatly to be regretted that, in the meantime, the Area Boards should cast doubts upon the integrity of honest traders who are compelled for the reasons already stated to base their charges upon the actual costs involved.

L. C. PENWILL,
Director and Secretary,
Electrical Contractors' Association.
London, W.C.2.

Boards and Contractors

AT the recent dinner of the Bradford Branch of the E.C.A., Col. W. M. Lapper, chairman of the Yorkshire Electricity Board, who was the chief guest, said that the Area Board was anxious to continue the happy co-operative relations which had existed in the past between the electricity supply authorities and the members of the E.C.A.

An advertisement of the Yorkshire Electricity Board published at about the same time reads "Service for Electricity Consumers. We are at your service in connection with every aspect of the installation and utilization of electricity in factory, office, shop or home. Maintenance. Repairs."

How can there be happy relations when the great supply authorities are trying to cut the throats of thousands of contractors and ruin them. If these authorities will attend to their proper business of generating and supplying electricity, as much as is wanted by consumers at the lowest possible price, they will have quite enough to do without trespassing on the domain of the contractors.

My advice to the B.E.A. is to get on with its own work and make a good job

of it, a thing it isn't doing at present, and leave the business of installation alone.

HARRY MOSS, M.I.E.E., F.I.E.S.
Bradford.

Earthing Electric Irons

I WAS looking round a large store the other day and was surprised to see a large display of irons without provision for earthing the outer metal casing.

It seems to me that the substitution of three-core for twin flex and a small metal clip on the connector would not materially increase the cost of these irons, and would certainly make them much safer for the user. Some manufacturers still do not take heed, despite the number of deaths from electric shock.

Dorchester. STANLEY ROGERS.

[The trouble with electric irons is that they are too frequently attached to lampholders in which case any provision for earthing is useless and possibly dangerous. The real remedy is more plug points.—Editors, *Electrical Review*.]

Earth Leakage Trips

I HAVE just been examining an earth leakage circuit-breaker in which the trip coil is used only to close a pair of points which, in turn, complete a second circuit wherein the actual "opening" solenoid is connected directly across the mains. On a rough test the trip worked well, the breaker opening in no uncertain manner with a fault of only a very few volts to earth. If, however, the incoming neutral were disconnected the trip would become inoperative.

I cannot help wondering if those who advocate this system are prepared entirely to rule out the possibility of the neutral line becoming broken, thus preventing the breaker opening, even though a serious earth fault were present on an installation.

My own experience as a contractor in an area which is served by a somewhat sketchy overhead low voltage system suggests that this possibility is worth at least passing consideration.

"UBIQUE."

Merseyside Industrial Development

IN the industrial survey of Merseyside based on research by the Lancashire Industrial Development Association, it is stated that between 1929 and 1947 there was an increase of from 4,978 to 14,532 insured workers in the electrical apparatus, cable, and lamp industries.

The survey states that there are many hundreds of organizations engaged in light engineering on Merseyside, but the great majority is made up of small concerns with under 500 employees. An analysis of a typical cross-section of the industry gives the following approximate percentages:—Factories with under 100 employees 19 per cent; 100-500 employees, 19 per cent; 500-1,000 employees, 6 per cent; 1,000-5-000 employees, 4 per cent; over 5,000 employees, 2 per cent. A large number of those firms with under 500 employees are old-established concerns engaged in work requiring individual craftsmanship rather than heavy capital.

The total number of employees in this cross-section is distributed among Merseyside's numerous engineering activities in the following way: Electric cables and overhead transmission systems, 38.2 per cent; automatic telephones and electric signalling systems, 22.2 per cent; general electrical engineering, 5.5 per cent; metalworking activities, 5.3 per cent; machinery, 5 per cent; metal containers, 4.7 per cent; domestic electrical appliances, 3.4 per cent; trucks, trolleys and handling equipment, 2.9 per cent; ship telegraphs and propellers, 2.8 per cent; and other industries, 11 per cent.

Apart from marine engineering, the largest of Merseyside's engineering activities is cable making, which dates from 1886. To-day, cables are turned out for every industrial purpose. The manufacture of automatic telephone exchange equipment and subscribers' apparatus began in Liverpool in 1912. One of the largest firms engaged in these activities is on Marseyside and employs 9,700 workers. To-day it is turning out huge quantities of telephone equipment for export.

The survey concludes with the statement that Merseyside's many problems will not be met merely by the setting up of factories for consumer industries and it must be emphasized that the great need is for industries employing more male workers. Apart from making it possible to work out some policy for Merseyside as a whole, which is highly desirable, scheduling can only be of maximum advantage if its aim is to secure a sound balance as between light and heavy industries.

PERSONAL and SOCIAL

News of Men and Women of the Industry

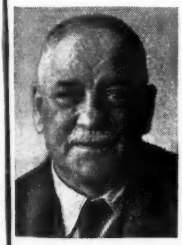
AT the annual meeting of the Newcastle-on-Tyne branch of the Electrical Contractors' Association, **Mr. V. Ferens** (F. Reid, Ferens and Co., Ltd.), was re-elected chairman, **Mr. J. Gibson** vice-chairman, and **Mr. E. P. Rickard** secretary.

Mr. R. Francies, T.D., M.I.E.E., has been appointed managing director of Hurseal, Ltd., in succession to the late Mr. Max Hurley. Mr. Francies has been associated with electric space heating for many years and has been largely responsible for the development of the Hurseal radiator.

Mr. Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., has been elected president of the Institute of Export for the seventh year in succession. He has also been elected chairman of the Overseas Standards Advisory Committee of the British Standards Institution.

Sir Harold Hartley, K.C.V.O., C.B.E., F.R.S., chairman of the British National Committee of the World Power Conference, will be one of the United Kingdom representatives at the United Nations Scientific Conference on the Conservation and Utilization of Resources, to be held at Lake Success, New York, from 17th August to 6th September next.

Mr. F. A. Martin, secretary of No. 1 (Bradford) Sub-Area of the Yorkshire Electricity Board, has completed fifty years' service with the electricity supply industry in Bradford, and to mark the occasion a dinner was recently given in his honour at which Col. W. M. Lapper, chairman of the Yorkshire Electricity Board, presented him with an inscribed silver salver. Mr. Martin commenced his association with the Bradford Corporation Electricity Department as a junior clerk on 1st May, 1899, and when the undertaking was nationalized, he was managerial assistant. In addition to his work with the Bradford undertaking, Mr. Martin was assistant secretary to the Yorkshire Electricity Supply Linking Up Committee (1914-1918). He assisted in connection with the scheme prepared by the Conference of West Riding Local Authorities for establishing a Joint Electricity Authority for the West Riding (Aire and Calder) Electricity District (1920-1924). He was hon. secretary from 1930 to 1931 of the Bulk Supply Sub-Committee of the Mid-East England Centre of the I.M.E.A.



Mr. F. A. Martin

Mr. H. S. Lamburd relinquished the position of managing director of Asea Electric, Ltd., on 15th March and he has now left this country to take charge of the Asea interests in Australia and New Zealand. He has been succeeded as managing director by **Mr. H. V. Pointon,** who, before returning to Great Britain early this year, was in charge of the company's business in India, Pakistan, Burma, Ceylon and Malaya. During his twenty-four years in the East, Mr. Pointon became a well-known figure in the electrical world and he was connected with many important power development schemes. He was also a J.P. and an honorary presiding magistrate for Greater Bombay. He is a past chairman of the Junior Institution of Engineers. Mr. Pointon received his early training with the Metropolitan Electric Supply Co., Ltd., and he joined his present company, then the Swedish General Electric, in 1920.

Mr. H. S. Lamburd

Mr. H. V. Pointon

At a general meeting of the International Federation of the Phonographic Industry just concluded in Amsterdam, Holland, **Sir Ernest Fisk,** managing director of Electric & Musical Industries, Ltd., was unanimously re-elected president of the Federation.

Mr. G. L. Perkins, Winchester, has resigned from the Southern Electricity Consultative Council on appointment as a part-time member of the Southern Gas Board.

On Wednesday last honorary associateships of the Birmingham Central Technical College were conferred upon **Mr. J. J. Gracie,** M.I.E.E., general manager of the Engineering Works, Witton, of the General

Electric Co., Ltd., **Mr. F. W. Lawton,** M.I.E.E., Midlands divisional controller, British Electricity Authority, and **Dr. W. Wilson,** B.Eng., M.I.E.E., manager of the Development Laboratories of the General Co., Ltd., Witton.

Among his many activities Mr. Gracie is chairman of the Greater Birmingham Employment Committee and of the Executive Committee of the Midland Council on Productivity. He is a member of the Governing Body of Birmingham Central Technical College and a life governor of the University of Birmingham.

Mr. Lawton, who is awarded the honorary associateship of the College in recognition of his advancement of the technique of electrical generation and distribution, was chief engineer of the Birmingham Electric Supply Department, before being appointed Midlands divisional controller on the nationalization of the electricity undertaking.

Dr. Wilson joined the G.E.C. in 1917 to found the Development Department for switch and control gear, which was merged in the Development Laboratory of which he now has charge. He holds over sixty patents, chiefly in connection with switch, control and protective gear. He is a visiting lecturer of the College.

Mr. G. L. d'Ombrain, Ph.D. (Eng.), B.Sc. (Eng.), M.I.E.E., D.I.C., A.C.G.I., has been appointed Head of the Electrical Department of Battersea Polytechnic in succession to **Mr. A. T. Dover,** M.I.E.E., who is retiring in July; the appointment is to take effect as from 1st September. Mr. d'Ombrain received his training at the Imperial College of Science and Technology and after a varied industrial and research experience returned to the Imperial College as a member of the staff. He left to take up the Chair of Alexandria, later returning to England to become managing director of Brun Engineering, Ltd., and to act as consultant to various companies, including Permutit, Ltd. Mr. d'Ombrain tells us that he is retaining certain consultantships and will remain on the board of Brun Engineering, Ltd.

Dr. G. L. d'Ombrain

Last Saturday evening the **I.E.E. London Students' Section** held an informal dance at the North Hall, Victoria Halls, Bloomsbury. About 250 members and friends attended.

Mr. W. M. Tribute, advertising and publicity manager of Hoover, Ltd., is the first to complete thirty years' service with the company. His staff has presented him with a brief-case and fountain pen.

Princess Elizabeth and the **Duke** of **Edinburgh** have consented to extend their patronage to the Fourth World Power Conference to be held in London from 10th to 15th July, 1950.

An "at home" for employees, their families and friends was held at the Diesel Works, Peterborough, of **F. Perkins, Ltd.,** on 7th May. Over 5,000 people were present.

Obituary

Mr. P. Jameson.—The death has occurred at his home, South Hylton, Sunderland, of Mr. Percy Jameson, chief electrical engineer with John Lynn & Co., Ltd., Sunderland.

Mr. J. T. Corneille.—The death occurred on 24th April at Somerset West, Cape Province, South Africa, of Mr. J. T. Corneille, M.I.Mar.E., formerly of Veritys, Ltd. Mr. Corneille became associated with Veritys in 1901, and on his retirement in 1947 went to live in South Africa. He was mainly concerned with the marine side of Veritys business.

Mr. A. Feld.—The death occurred on 30th April, at Putney Hospital after a brief illness of Mr. August Feld, managing director of Wandleside Cable Works, Ltd.

Next Week's Events

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of it, a thing it isn't doing at present, and leave the business of installation alone.

HARRY MOSS, M.I.E.E., F.I.E.S.
Bradford.

Earthing Electric Irons

I WAS looking round a large store the other day and was surprised to see a large display of irons without provision for earthing the outer metal casing.

It seems to me that the substitution of three-core for twin flex and a small metal clip on the connector would not materially increase the cost of these irons, and would certainly make them much safer for the user. Some manufacturers still do not take heed, despite the number of deaths from electric shock.

Dorchester. STANLEY ROGERS.

[The trouble with electric irons is that they are too frequently attached to lampholders in which case any provision for earthing is useless and possibly dangerous. The real remedy is more plug points.—Editors, *Electrical Review*.]

Earth Leakage Trips

I HAVE just been examining an earth leakage circuit-breaker in which the trip coil is used only to close a pair of points which, in turn, complete a second circuit wherein the actual "opening" solenoid is connected directly across the mains. On a rough test the trip worked well, the breaker opening in no uncertain manner with a fault of only a very few volts to earth. If, however, the incoming neutral were disconnected the trip would become inoperative.

I cannot help wondering if those who advocate this system are prepared entirely to rule out the possibility of the neutral line becoming broken, thus preventing the breaker opening, even though a serious earth fault were present on an installation.

My own experience as a contractor in an area which is served by a somewhat sketchy overhead low voltage system suggests that this possibility is worth at least passing consideration.

"UBIQUE."

Merseyside Industrial Development

IN the industrial survey of Merseyside based on research by the Lancashire Industrial Development Association, it is stated that between 1929 and 1947 there was an increase of from 4,978 to 14,532 insured workers in the electrical apparatus, cable, and lamp industries.

The survey states that there are many hundreds of organizations engaged in light engineering on Merseyside, but the great majority is made up of small concerns with under 500 employees. An analysis of a typical cross-section of the industry gives the following approximate percentages:—Factories with under 100 employees 19 per cent; 100-500 employees, 19 per cent; 500-1,000 employees, 6 per cent; 1,000-5-000 employees, 4 per cent; over 5,000 employees, 2 per cent. A large number of those firms with under 500 employees are old-established concerns engaged in work requiring individual craftsmanship rather than heavy capital.

The total number of employees in this cross-section is distributed among Merseyside's numerous engineering activities in the following way: Electric cables and overhead transmission systems, 38.2 per cent; automatic telephones and electric signalling systems, 22.2 per cent; general electrical engineering, 5.5 per cent; metalworking activities, 5.3 per cent; machinery, 5 per cent; metal containers, 4.7 per cent; domestic electrical appliances, 3.4 per cent; trucks, trolleys and handling equipment, 2.9 per cent; ship telegraphs and propellers, 2.8 per cent; and other industries, 11 per cent.

Apart from marine engineering, the largest of Merseyside's engineering activities is cable making, which dates from 1886. To-day, cables are turned out for every industrial purpose. The manufacture of automatic telephone exchange equipment and subscribers' apparatus began in Liverpool in 1912. One of the largest firms engaged in these activities is on Marseyside and employs 9,700 workers. To-day it is turning out huge quantities of telephone equipment for export.

The survey concludes with the statement that Merseyside's many problems will not be met merely by the setting up of factories for consumer industries and it must be emphasized that the great need is for industries employing more male workers. Apart from making it possible to work out some policy for Merseyside as a whole, which is highly desirable, scheduling can only be of maximum advantage if its aim is to secure a sound balance as between light and heavy industries.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT the annual meeting of the Newcastle-on-Tyne branch of the Electrical Contractors' Association, **Mr. V. Ferens** (F. Reid, Ferens and Co., Ltd.) was re-elected chairman, **Mr. J. Gibson** vice-chairman, and **Mr. E. P. Rickard** secretary.

Mr. R. Francies, T.D., M.I.E.E., has been appointed managing director of Hurseal, Ltd., in succession to the late Mr. Max Hurley. Mr. Francies has been associated with electric space heating for many years and has been largely responsible for the development of the Hurseal radiator.

Mr. Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., has been elected president of the Institute of Export for the seventh year in succession. He has also been elected chairman of the Overseas Standards Advisory Committee of the British Standards Institution.

Sir Harold Hartley, K.C.V.O., C.B.E., F.R.S., chairman of the British National Committee of the World Power Conference, will be one of the United Kingdom representatives at the United Nations Scientific Conference on the Conservation and Utilization of Resources, to be held at Lake Success, New York, from 17th August to 6th September next.

Mr. F. A. Martin, secretary of No. 1 (Bradford) Sub-Area of the Yorkshire Electricity Board, has completed fifty years' service with the electricity supply industry in Bradford, and to mark the occasion a dinner was recently given in his honour at which Col. W. M. Lapper, chairman of the Yorkshire Electricity Board, presented him with an inscribed silver salver. Mr. Martin commenced his association with the Bradford Corporation Electricity Department as a junior clerk on 1st May, 1899, and when the undertaking was nationalized, he was managerial assistant. In addition to his work with the Bradford undertaking, Mr. Martin was assistant secretary to the Yorkshire Electricity Supply Linking Up Committee (1914-1918). He assisted in connection with the scheme prepared by the Conference of West Riding Local Authorities for establishing a Joint Electricity Authority for the West Riding (Aire and Calder) Electricity District (1920-1924). He was hon. secretary from 1930 to 1931 of the Bulk Supply Sub-Committee of the Mid East England Centre of the I.M.E.A.

Mr. F. A. Martin

Mr. H. S. Lamburd relinquished the position of managing director of Asea Electric, Ltd., on 15th March and he has now left this country to take charge of the Asea interests in Australia and New Zealand. He has been succeeded as managing director by **Mr. H. V. Pointon,** who, before returning to Great Britain early this year, was in charge of the company's business in India, Pakistan, Burma, Ceylon and Malaya. During his twenty-four years in the East, Mr. Pointon became a well-known figure in the electrical world and he was connected with many important power development schemes. He was also a J.P. and an honorary presiding magistrate for Greater Bombay. He is a past chairman of the Junior Institution of Engineers. Mr. Pointon received his early training with the Metropolitan Electric Supply Co., Ltd., and he joined his present company, then the Swedish General Electric, in 1920.

Mr. H. S. Lamburd

Mr. H. V. Pointon

At a general meeting of the International Federation of the Phonographic Industry just concluded in Amsterdam, Holland, **Sir Ernest Fisk,** managing director of Electric & Musical Industries, Ltd., was unanimously re-elected president of the Federation.

Mr. G. L. Perkins, Winchester, has resigned from the Southern Electricity Consultative Council on appointment as a part-time member of the Southern Gas Board.

On Wednesday last honorary associateships of the Birmingham Central Technical College were conferred upon **Mr. J. J. Gracie,** M.I.E.E., general manager of the Engineering Works, Witton, of the General

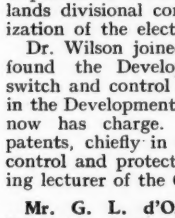
Electric Co., Ltd., **Mr. F. W. Lawton,** M.I.E.E., Midlands divisional controller, British Electricity Authority, and **Dr. W. Wilson,** B.Eng., M.I.E.E., manager of the Development Laboratories of the General Co., Ltd., Witton.

Among his many activities Mr. Gracie is chairman of the Greater Birmingham Employment Committee and of the Executive Committee of the Midland Council on Productivity. He is a member of the Governing Body of Birmingham Central Technical College and a life governor of the University of Birmingham.

Mr. Lawton, who is awarded the honorary associateship of the College in recognition of his advancement of the technique of electrical generation and distribution, was chief engineer of the Birmingham Electric Supply Department, before being appointed Midlands divisional controller on the nationalization of the electricity undertaking.

Dr. Wilson joined the G.E.C. in 1917 to found the Development Department for switch and control gear, which was merged in the Development Laboratory of which he now has charge. He holds over sixty patents, chiefly in connection with switch, control and protective gear. He is a visiting lecturer of the College.

Mr. G. L. d'Ombrain, Ph.D. (Eng.), B.Sc. (Eng.), M.I.E.E., D.I.C., A.C.G.I., has been appointed Head of the Electrical Department of Battersea Polytechnic in succession to **Mr. A. T. Dover,** M.I.E.E., who is retiring in July; the appointment is to take effect as from 1st September. Mr. d'Ombrain received his training at the Imperial College of Science and Technology and after a varied industrial and research experience returned to the Imperial College as a member of the staff. He left to take up the Chair of Alexandria, later returning to England to become managing director of Brun Engineering, Ltd., and to act as consultant to various companies, including Permutit, Ltd. Mr. d'Ombrain tells us that he is retaining certain consultantships and will remain on the board of Brun Engineering, Ltd.



Dr. G. L. d'Ombrain

Last Saturday evening the **I.E.E. London Students' Section** held an informal dance at the North Hall, Victoria Halls, Bloomsbury. About 250 members and friends attended.

Mr. W. M. Tribute, advertising and publicity manager of Hoover, Ltd., is the first to complete thirty years' service with the company. His staff has presented him with a brief-case and fountain pen.

Princess Elizabeth and the **Duke of Edinburgh** have consented to extend their patronage to the Fourth World Power Conference to be held in London from 10th to 15th July, 1950.

An "at home" for employees, their families and friends was held at the Diesel Works, Peterborough, of **F. Perkins, Ltd.,** on 7th May. Over 5,000 people were present.

Obituary

Mr. P. Jameson.—The death has occurred at his home, South Hylton, Sunderland, of Mr. Percy Jameson, chief electrical engineer with John Lynn & Co., Ltd., Sunderland.

Mr. J. T. Corneille.—The death occurred on 24th April at Somerset West, Cape Province, South Africa, of Mr. J. T. Corneille, M.I.Mar.E., formerly of Veritys, Ltd. Mr. Corneille became associated with Veritys in 1901, and on his retirement in 1947 went to live in South Africa. He was mainly concerned with the marine side of Veritys business.

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I.E.E. Annual Report

FURTHER INCREASE IN MEMBERSHIP

AT the annual general meeting of the Institution of Electrical Engineers held yesterday (Thursday), the Council presented its report for the session which ended 31st March, 1949. During this period the membership increased by 1,464 (net) to 34,371, of whom 16,027 are corporate members and 7,829 graduates.

Meetings held in London and at the local centres numbered 1,203. Attendance at the ten ordinary meetings held in London averaged 305. Two joint meetings were held with the Institution of Mechanical Engineers and one with the Institution of Civil Engineers. For the Sections the number of meetings, average attendance and total membership were: Utilization, 8, 115, 2,955; Supply, 9, 136, 2,864; Measurement 15, 102, 1,753; Radio, 16 (excluding the Convention on Scientific Radio), 128, 4,084.

Sections' Scope Revised

The definition and scope of each of the sections has been revised so as to keep them in line with the trend of developments in electrical engineering. As generation was included in the scope of the Transmission Section, its title was changed to Supply Section. Similar considerations led to the Installations Section being renamed Utilization Section when heavy engineering, except where concerned with generation, was added to its scope. Two more Sub-Centres have been formed, the North Staffordshire and the North Lancashire.

In conjunction with the Councils of the Institution of Civil Engineers and the Institution of Mechanical Engineers, regulations submitted by the Joint Overseas Activities Committee have been approved for the establishment of Joint Groups in overseas areas other than in a Dominion where a national engineering body exists. It has also been decided that novel or specialized equipment of outstanding scientific interest can be exhibited in the entrance hall provided that it is shown anonymously and does not interfere with the amenities of the hall.

In common with the Institutions of Civil and Mechanical Engineers, the Council is sponsoring a joint engineering conference which will be held from the 4th to 16th June, 1951, while the Festival of Britain is in progress. At this conference papers mainly describing British engineering practice will be read.

Meetings of the Electrical Engineering Advisory Committee of the Ministry of Labour and National Service have been held at regular intervals. Of the total number of registrants, less than 25 per cent are unemployed and the number of vacancies is double the number of unemployed registrants. There is still difficulty in placing registrants of over 45, and the Council appeals to employers not to stipulate too low an age when submitting particulars to the Ministry. The report of the Professional Engineers' Appointments Bureau for 1948 shows that the average number on the register was 559, of whom 201 were electrical engineers.

During the year the number of library readers amounted to 7,800, of whom 780 were non-members. Books and pamphlets totalling 706 were presented by members and others, and 230 volumes were purchased. A new list of Associates, Graduates and Students will be printed this year.

The first annual general meeting of the Incorporated Benevolent Fund was held on 4th November, 1948. From 20th November, 1947, to that date grants amounting to £3,569 were made to eighty-four persons. The number of members supporting the fund has increased to over 9,000, representing 40 per cent of the total membership. An earnest appeal is made to the remaining 60 per cent. The capital of the Wilde Fund stood at £3,050, all of which is invested, producing an annual income of £94. Grants making up a total of £52 were made from this fund.

As a result of appeals for the Homes Fund the amount received up to 30th June, 1948, was £18,074, but a number of members have signed deeds of covenant promising in the aggregate nearly £22,000. A building licence for the erection of three units (one house and two flats) on "The Chesters" residential estate has been granted by the local authority.

I.E.E. Students' Norwegian Tour

ARRANGEMENTS have been made for a party of forty student and graduate members of the Institution of Electrical Engineers, drawn from all parts of the United Kingdom, to visit Norway from 13th to 29th August next. The programme of visits is in the hands of Den Norske Ingeniøforening and will include Broadcasting House, a cable manufacturing plant and the Municipal Light and Power Co. in Oslo, and power plants at Rjukan and Tyin. Other places in the itinerary are Otta, Fortun, Kaupanger, Ardal (where a day will be spent mountaineering), Flaam, Myrdal, Voss and Bergen.

British Industries Fair

SECURING RECIPROCAL TRADE

SPEAKING at a luncheon organized by the Management Committee of the Birmingham Section of the Fair last week, Mr. H. W. Bosworth, chairman of the B.E.A.M.A. Council, asked overseas buyers to make greater endeavours to secure reciprocal trade with Great Britain. He said that it was necessary to tell those countries from which we took food and raw materials that they *had* to buy from Britain if we were to continue to buy from them.

Moreover, their purchases must not be merely of special products—whisky, fine woollen goods and porcelain—but of our everyday products, such as electric motors, and heaters and radio sets. This would mean the removal of many restrictions placed upon imports.

Mr. Bosworth showed how great a part the electrical industry was playing at home and in export trade. In 1948 exports had reached a value of over £100 million against £21 million in 1938, and a target of £130 million had been set for 1949. But we had to face the end of the sellers' market, declining prices, increasing competition and protective tariffs—sometimes prohibitive.

At the same time there was a declining home consumption, particularly of the lighter products, caused partly by purchase tax. This deprived us of a basis for the export of our goods.

Export Handicaps

Regarding trade with Canada, Mr. Bosworth said that although our exporters faced a tariff of 15 per cent and had export costs amounting to 6 or 7 per cent, they were told that their goods must be at least 5 per cent cheaper than local products if they were to compete with American goods. That meant that we were expected to produce our goods at a cost 20 per cent less than that of the most efficient Canadian and American manufacturers. Similar handicaps had to be faced in the Australian market.

In South America strange probabilities could rise quite suddenly. His own company had had the experience of packing 70 cases of electric motors ready for shipment when the order was suddenly cancelled and the machines had to be re-wound for other markets.

On top of this British manufacturers had to pay much more for their raw materials than the Americans. It was almost a joke to ask us to send engineering goods to the United States. It was also strange that while we were sending out teams to learn production methods the United States had imposed tariffs to prevent this "inefficient" country from swamping them with electrical goods.

High Quality of Exhibits

Mr. Walter F. Higgs, president of the Birmingham Chamber of Commerce (organizers of the Castle Bromwich Section of the Fair) was the principal guest at a B.I.F. luncheon meeting of the Purchasing Officers' Association in Birmingham on 4th May. Mr. Higgs said that although he was often critical of the quality and finish of British goods, he thought that the products exhibited at Castle Bromwich were of the highest standard and would do much to enhance the country's prestige. It was a major objective to attract foreign buyers to the Fair, but it was no less important that the home buyer should also be catered for, as he purchased the materials and components from which exported goods were made. A vote of thanks to Mr. Higgs was proposed by Mr. T. F. Turner, chief purchasing agent to the English Electric Co., Ltd.

Future Power Sources

The Midlands Electricity Board and the British Electrical Development Association held their British Industries Fair dinner at the Queen's Hotel, Birmingham, on Tuesday, Mr. H. J. Gibson, chief commercial officer to the Midlands Board, taking the chair.

Proposing the toast of "The British Electrical Development Association," Professor M. L. E. Oliphant, vice-principal of the University of Birmingham, said there was still a tremendous amount of scope for a body such as the Electrical Development Association even though the electricity supply industry had been nationalized.

One of the big problems facing every country was the price of power and the provision of sufficient power. One had to face one particular problem, namely, the transmission of electrical energy without loss. The grid system had made a big difference but how much better it would be if we could generate electricity nearer the sources of coal and distribute it without loss.

A French physicist, Dr. Felici, had propounded a scheme for the production of electricity by the use of electrostatic generators. If one designed a generator and placed it in a gas of low viscosity such as hydrogen, electric power could be generated with-

out iron or copper losses. The power output per cubic yard of machine was about the same as from best present-day generators. The electrostatic generator generated direct current at above ½ million volts. It could not be damaged and it generated without iron and copper losses. It could be used to introduce power into any distribution line up and down the country.

These electrostatic machines worked just as well, he said, as motors and could be used to drive alternators. With such a development—and he could visualize it coming—it would be possible to provide electricity in parts of the world otherwise impossible. He believed wholeheartedly in electricity for all services including space heating.

Referring to the possibility of generating electric power by the use of atomic energy, Professor Oliphant said that 1 lb of uranium or thorium would develop as much energy as from 1,500 tons of coal. One difficulty was that the residual products were not just ashes but highly radioactive material which destroyed living matter. An atomic generating station of the capacity of Hams Hall would produce radioactive material equivalent to 100 tons of radium a day. If this was spread over the country it would kill everything over 10,000 square miles. Other technical problems included the running of these generators at high enough temperatures to feed gas or steam turbines to enable them to operate efficiently. This involved the problem of corrosion of materials.

It was likely to be some years before atomic stations would replace existing power stations but he was absolutely sure they would. There was a possibility that if we could treat hydrogen in the same way as the sun and build up from it heavier elements, it would be possible to derive about ten times as much power per pound as from uranium and thorium. We would be able to get between 10 million and 100 million kWh per lb of hydrogen. It was only a question of time before we learnt how to do this. The potentials with which physicists dealt were in millions; they were already producing 26 million volts, and this year would be able to reach 130 million. The task of E.D.A. to sell new uses of electricity to the country had scarcely begun.

E.D.A.'s Opportunity

Replying, Mr. R. A. S. Thwaites, chairman of the E.D.A. Council, said the recent relaxation of restrictions relating to the use of electricity for advertising purposes had given E.D.A. the chance for which it had been waiting for ten years. The B.E.A. had now intimated that in the summer electricity consumers should be encouraged to use electricity to full advantage. The use of electricity in industry was still only half what it was in the U.S.A. and he was convinced that it must be increased if we were to take advantage of the limited manpower available.

Alderman W. S. Lewis, chairman of the Midlands Electricity Board, said that for too long people had been told when not to use electricity, and now they had to be told when to switch on. Electricity at 0.75d per kWh was still the cheapest product in the country.

Mr. F. W. Martin, managing director, Tube Products, said that the electricity supply industry now had to regain the confidence of consumers.

Electrical Exhibitors

The following concerns were omitted from the list of exhibitors given in our 29th April issue:—

Yorkshire Switchgear & Engineering Co., Ltd., Meanwood, Leeds, 6. **C 112.**—Representative of the range manufactured by this company were a low-voltage 400 A 25 MVA I.V.I.L. metal-clad unit, hand operated, and a 6.6 kV metal-clad unit 400 A 150 MVA with spring closing mechanism, also a 6.6 kV 200 A oil-immersed ring isolator forming a part of a ring main unit. This switchgear can be installed either indoors or outdoors. It is climatic laboratory tested.

Electro Mechanical Manufacturing Co., Ltd. C 112.—Representative of this range of low-voltage metal-clad gear were three switchboards of unit construction, industrial type, for all services up to 600 V and up to 1,200 A, including busbar chambers, fused switches, lighting distribution and small power control boxes and aerial fuses. This equipment can be installed indoors or outdoors and has also been climatic laboratory tested.

S. O. Bowker, Ltd., 19-21, Warstone Lane, Birmingham, 18. **C 703.**—"Tenby" installation wiring accessories, complete wiring systems for c.t.s. and lead-covered cable, "Bakelite" ceiling roses, switch plates, brass and rubber bushes, porcelain connectors, insulated staples, "Tenbyluxe" switches, "Tenby" pilot switches, switch plugs, bell pushes, steel channelling, wood casing.

It is regretted that in last week's issue, in the section dealing with instruments at the British Industries Fair, the captions to three of the illustrations were transposed. The left-hand picture on page 782 should have been described as the "High-power stroboscope (B.E.P.)" and the right-hand one "Universal valve tester (Cintel)". The instrument illustrated at the bottom of page 783 was the Baldwin X-ray dose and dose rate meter.

Electrical Exports by Air

Little-known Possibilities

By JOHN C. HANCOCK

THE raising of the Berlin blockade by the Russians this week and the eventual cessation of the stupendous air lift will once again make available large numbers of freight planes for ordinary commercial flying. The success of the Berlin air lift naturally directs attention to extending the possibilities of this, the newest and speediest form of transportation.

But are electrical traders and manufacturers fully aware of the services which already exist for sending their exports by air, and are they prepared to examine more closely, in the light of the specific characteristics of their own products, the air freight facilities which are now available?

Admittedly air freight constitutes a substantial proportion of the on-site cost of a particular item of equipment, but some classes of electrical goods, such as instruments and other delicate mechanisms may be sent by air with a minimum of packing, which reduces the overall weight of the consignment. The extra attention which the airlines guarantee to give to freight entrusted to their care minimizes the risks of damage and pilferage, which in turn reduces the cost of insurance and the prospect of having to supply replacements. Insurance rates covering the ordinary transit risks are about the same as marine rates.

Favourable Effect on Customers

To stress the advantages, where urgent delivery is demanded, of sending goods by air is hardly necessary. The psychological effect on a prospective customer of being offered delivery by air will often induce him to place an order for some badly needed equipment, even if it means an addition to the normal price.

The two principal methods of consigning goods by air are: (1) By scheduled airline service, and (2) by specially chartered craft. In the first instance, the exporter may, either personally or through his usual forwarding agent send his goods to the nearest air cargo booking office—after first discovering whether and if so with what frequency a service operates to the required destination. The goods must be accompanied by an "Air Consignment Note/Waybill" or "Instructions for Despatch" filled in as required by the air authorities. The Customs specification covering the export of the goods must be presented before loading, as well as three copies of the commercial invoice. Where necessary, an export licence, Exchange Control Form CD3, certificate of origin and consular invoice must also be presented by the exporter at the time the goods are tendered for carriage. Generally, freight and ancillary charges must be prepaid by the sender.

Use of G.P.O. Service

One point which needs emphasizing is that the "Air Waybill" has more or less the same non-negotiable qualities as a railway consignment note. In other words, no document of title, such as a bill of lading, has yet been adopted covering goods sent by air. This is a grave omission which will have to be rectified sooner or later if air transport is to develop on sound commercial lines.

If, as sometimes happens on the Far Eastern routes, the exporter finds that he has to queue up for freight space—and delays up to 14 days are not uncommon—he can very often circumvent such delays by sending his packages, if they do not exceed 2 kg each in weight, by air mail through the ordinary G.P.O. service. G.P.O. mail is always given precedence over other cargo when the scheduled aircraft are running fully laden.

So far, we have dealt with goods in small quantities, but what does the electrical trader or manufacturer do when he is confronted with a large consignment—weighing perhaps several hundredweights or tons—which he has been asked to send by air? At, say, 16s per kilogram, less a "quantity discount,"

the freight could amount to a staggering figure. The answer may well be to charter a plane specially for the load, which can be done either through one of the regular airlines or charter companies; or, better still perhaps, through the Air Section of the Baltic Exchange in London.

Formed just over a year ago, this Section fulfils the same function as the two-hundred-year-old Baltic Exchange does for the chartering of ships. In a word, the "Baltic" is a meeting place where shippers of cargo and owners of aircraft can exchange information on freight that is being offered and the craft available to take it. The electrical trader or manufacturer has no need to go in person to the "Baltic" in order to offer his cargo—he can do this much more advantageously by appointing a broker to act on his behalf. This will not cost him anything; nor will he be obliged to take any offers of space which are submitted to him.

The Baltic Exchange, being a free competitive market, is to a certain extent responsible for the fixing of charter rates. No standard rates are laid down; they are governed by the quantity of cargo on offer and the availability of air space. Cargo rates quoted are for the round trip, which means that the cost may have to cover an empty flight on the homeward journey. On the other hand, if a return load can be arranged, then the outward rate may be quoted to the shipper at half the figure for the round trip.

From this somewhat sketchy outline of the workings of the Baltic Exchange, electrical traders and manufacturers will be able easily to see the advantage of placing their air freight inquiries through an active broker. This holds good, even if they do not have full cargoes, for several part-cargoes can sometimes be combined to make up an economic load.

Air transport has its own organization, the International Air Traffic Association, through which the scheduled airlines of the world unify and standardize as many phases of their operations as possible. In this way they endeavour to achieve the maximum safety, efficiency and economy in all their operations.

Engineers-in-Charge

PROPOSING the toast of "The Institution" at the forty-fourth annual dinner of the Institution of Engineers-in-Charge on 6th May, Sir Stanley V. Goodall (vice-president, Institute of Naval Architects) said that practical engineers were themselves largely to blame if society did not give them their proper status (which was higher in the United States, for example). They allowed themselves to be absorbed in their work without regard for the world of affairs. The effect of ths tendency was partly corrected through the corporate effort of such bodies as their Institution, which received the friendly support of the senior Institutions, in educating them to think for themselves and to face facts, however unpleasant they might be.

Responding, Sir William Larke (president) expressed gratification that engineers were more concerned with their work than with its appraisal by the community. This work would not be done so well otherwise—so well that it was taken as a matter of course by others until some such trouble as load shedding occurred. On the other hand, technical competence was not enough, as leadership depended upon human understanding and sympathy. As men whose individual initiative (their inheritance from the great line of British practical engineers) was necessary to the recovery of the country, engineers must beware of the demoralizing effects of the present form-filling tendency.

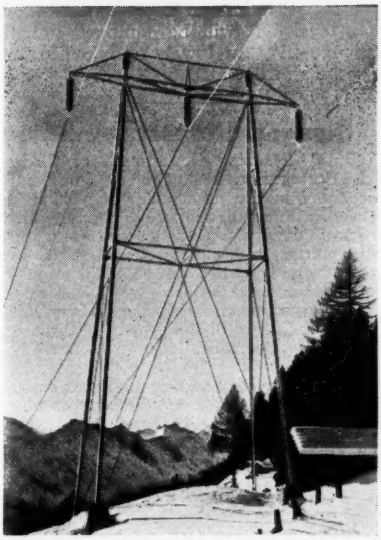
Sir William Stanier (vice-president) briefly proposed the health of "Our Guests," mentioning leading members of other Institutions who were present, for whom Dr. S. F. Dorey (vice-president, Institution of Mechanical Engineers) replied in a speech that emphasized the need for properly trained all-round engineers. These were especially needed for development work in the Colonies where they would add to the credit of this country and place orders for plant here. He suggested the desirability of licensing engineers, on the lines of the Board of Trade marine certificates of competency.

The president thanked Mr. A. E. Penn, who has been honorary secretary for forty-four out of the fifty-four years of the Institution's existence, and his son Mr. A. T. Penn, deputy honorary secretary, for their work.

Swiss Pylons

CONCRETE-FILLED TUBULAR STRUCTURES

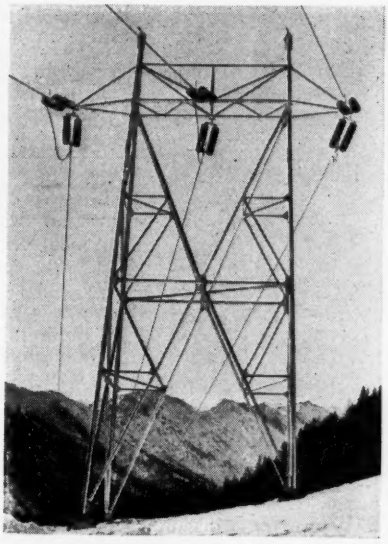
(From a Correspondent)



THE majority of the long-span overhead power lines constructed since 1913 by the Société Anonyme d'Entreprises Electriques (Motor-Columbus) of Baden, Switzerland, have been supported on lattice steel towers built up of angle sections, the cost of such towers amounting to half the total cost of the transmission line.

Cost can be reduced and up to two-thirds of the weight can be saved by constructing pylons of steel tubes filled with concrete, which permit the use of much longer compression members than is possible with angle sections, the number of constructional members also being considerably reduced.

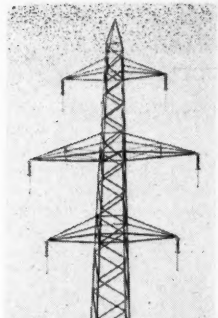
Concrete is a relatively cheap and easily transportable material. The filling of the tubes generally follows the erection of the towers, only struts and diagonals being filled before erection. By vibrating the concrete during the filling process, greater homogeneity is obtained. The simple design of joints, which was carefully studied, minimizes the number of bolts needed. If transport difficulties, or galvanizing requirements, make it necessary for the corner posts to be sectionalized, they can be spliced in the field without welding or bolting by means of special socket joints.



Two views showing representative towers of the 150 kV Nufenen Pass line

In the 150 kV transmission line over the Nufenen Pass in the Alps is a 12 km section on tubular towers. The average weight of steel is about 7.5 tons/km of the line, while for a corresponding line on angle-member towers approximately 21.5 tons/km of steel would have been needed. The saving in steel is, therefore, 65 per cent of the weight of the angle-section towers and, moreover, the cheapest tube (the welded seam type) can be employed in this method of tower construction. Savings in costs in Switzerland have increased with increase of transmission voltage, amounting to 30-40 per cent of the cost of the towers and 15-20 per cent of the cost of the entire transmission line.

Towers of the new design have been subjected to many tests, single constructional elements having been dealt with as well as completely erected towers. The new design was applied first to a single strain tower in the 50/150 kV line near Koblenz (Switzerland) and to certain towers in the 50 kV Biasca - Acquarossa (Switzerland) line.



Typical pylon for 220-380 kV Amsteg-Mettlan line

These were followed by a 12 km section of the 150 kV transmission line which goes over the Nufenen Pass connecting the Rhone and Tessin Valleys. The single-circuit Gotthard transmission line, built in 1932, is now being extended as a double-circuit line from Amsteg to Mettlan, over a distance of 52 km. All the 159 towers of the new section, some 67 metres high, are being constructed of concrete-filled tubes. Some of the spans are as long as 850 metres. The line is at present equipped for 22 kV with six 350 sq mm copper conductors as well as one 80 sq mm earth wire. The towers and their foundations are calculated to permit 380 kV to be used.

The 50 kV Davos-Filisur line is 18.3 km long; its 88 tubular towers and conductors were erected in about two months. The single-circuit line from Littau to Wolhusen, 15.3 km, has 66 such towers and the 150 kV line from Toss to Winkeln has 49 similar towers. The French railways are constructing a 45 km 60 kV line on tubular towers from Villefranche to Perpignan. Another important project is a new transalpine line with three conductors and two earth wires which will climb to 2,500 metres above sea level. It will be equipped initially for 220 kV, but towers and foundations are being calculated for 380 kV.

Glasgow Battery Vehicles

THE Cleansing Department of Glasgow Corporation has achieved considerable economy in the use of electric vehicles by the creation and operation of a system of battery handling. By this system the fleet of vehicles was successfully operated over the war years when replacements were unobtainable, and vehicles were worked on many occasions sixteen hours a day. The essential feature of the system is the use of overhead mechanical gear to move the batteries about.

Vehicles with a battery platform between the cab and the body are preferred to underslung electric types. Originally the batteries were removed sectionally or individually by hand, but that process was slow and an overhead travelling tackle was erected over the entire section of the garage adjoining the garage power house. Under this overhead system the Department laid out a system of thirty-seven charging points, consisiting of heavy wooden sleds (to carry the batteries), rubber tubing and the necessary controls.

Each of the batteries consists of forty-four cells of 520 Ah capacity. These charging points are in continuous use so that the Department has always a rota of fully charged batteries available. Each battery is tested on starting for temperature and acid gravity and log records are maintained.

Power is drawn from the adjacent Govan works, derived from consumption of refuse, at 6,500 V and stepped down to 440 V driving two 165 kW and two 250 kW sets; charging current is at 130 V. As a stand-by the garage has a second hoist and a second power unit, approximately of the same capacity.

Working possibly three cycles every two days, batteries have a life of approximately three years four months. Tudor batteries are used and the majority of the vehicles are Garrett 5-tonners.

Torquay's Illuminations

IT is reported that a special committee, in which the South Western Electricity Board is represented, has been set up at Torquay to examine proposals for a large extension of floodlighting along the sea front. Endeavours are being made to carry out the scheme in time for the British Electrical Power Convention to be held at Torquay from 13th to 17th June.

Industry and the House

Appointments to Consumers' Councils

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

MEMBERS of the House of Commons were quiet in mood when they resumed their seats after the Easter Recess. Labour doubts over Sir Stafford Cripps' Budget seemed to have been resolved, outwardly at any rate, in the interval. Some older Members are indeed suggesting that the House is reverting to the customary quiet of pre-1945 days. Business is disposed of as a rule in a less controversial atmosphere, and the proceedings are more leisurely, with the exception of the debate on the Report Stage of the Iron and Steel Bill.

The House was a little taken aback to find that some rearrangement of the order of questions had been worked out during the Recess. Normally the Minister of Fuel and Power answers questions on a Thursday, but his day has now been changed to Monday. A Member may, of course, put down a question to a Minister on any day of the week, but unless it is the Minister's day it goes towards the bottom of the list and is therefore unlikely to be reached during Question Hour. This deprives the Member of an oral reply and the opportunity to fire a supplementary question, although the Minister's prepared answer is published as usual in *Hansard* the following morning.

Political Affiliations

The first Member to take note of the new arrangement was Colonel Clarke, who asked the Minister of Fuel and Power why the Standing Joint Committee of Working Women's Organizations had been invited to make nominations for the Electricity Consultative Councils. Colonel Clarke contended that this body was closely associated with the Labour Party and he wanted to know whether representatives of other political parties had been invited to make similar nominations. The Minister and his supporters pointed out that the organization represented 2½ million working women and was therefore very representative. Other organizations similarly invited to make nominations might have affiliations with other parties, but that did not decide the issue.

The Opposition is right to keep a watchful eye on developments of this sort, although it is extremely doubtful whether Labour nominees to a consultative council would be any less active than those nominated by any other political party. As the field of nationalization extends there is bound to be a fringe in which political considerations of this sort may prove to be a factor without in any way becoming an adverse influence. At the same time it is necessary to delimit this area as far as possible and keep it within bounds.

Employees' Compensation

The Report Stage of the Commonwealth Telegraphs Bill was concerned almost entirely with matters affecting employees. Small amendments were made to Clause 6, which states the pensions provisions for employees of the operating company. An amendment enabling employees to recover the costs of a successful appeal to the Board of Referees was, however, unacceptable to the Postmaster General. He quoted precedents in other nationalization Bills which would be broken—bad precedents in the view of the Opposition. The discussion on Clause 7, which deals with compensation to the employees of the operating company, led to some sharp exchanges between the Financial Secretary and Mr. W. S. Shepherd, of the Bucklow Division. The Bill was, however, read the third time without further discussion and now passes to the Upper House.

The text of the Finance Bill was published last week and it contains no surprises, since it conforms closely to the Chancellor's Budget Speech. It is unlikely that the second reading of this Bill, which will provide an opportunity for more mature reflections on the Budget, will take place until after Sir Stafford Cripps' return from his holiday in Italy. With the Whitsun Recess beginning at the end of this month, the Committee

Stage can scarcely be taken until after the House resumes in June. It is during this stage that detailed amendments can be tabled for purchase tax concessions on domestic electrical equipment, radio receivers and other articles.

Iron and Steel Bill

Controversy broke out during the Report Stage of the Iron and Steel Bill, which took up four days of Parliamentary time after the Recess. The discussion of the Bill during the Committee Stage had been curtailed by the operation of the "guillotine" which fell after a certain number of sittings had been reached, thus cutting short discussion on a particular group of clauses and compelling the Committee to go on to the next group. The Government resorted to the same method on the Report Stage, and even more severely limited discussion of this Bill.

It will be recollected that the Electricity Bill was fully discussed without the operation of the guillotine in a far busier Session of Parliament than the present one. The Iron and Steel Bill will be the poorer for not having been properly discussed and appropriately amended.

On the first day the Minister of Supply introduced a new clause intended to define the general duties of the Corporation. The Minister pointed out that this clause contained most of the suggestions made by the Opposition during the Committee Stage and was designed to prevent the Corporation from showing undue preference to, or exercising unfair discrimination against, any persons or class of persons in the supply and price of steel products. Mr. Oliver Lyttelton was the first to acknowledge that the new clause was a great improvement on the previous clause, the place of which it took, but felt that it was not sufficiently precise. Supporting speakers wanted to know what the furtherance of the public interest, as referred to in the clause, really meant. It could mean much or little. Throughout the discussion on this and succeeding clauses the Minister was reluctant to limit either his powers or those of the Steel Corporation in any legal way, but preferred to rely upon Ministerial discretion, acting always "in the public interest."

The position of firms using steel as one of their raw materials is to be further safeguarded by the setting up of a consumers' council with subordinate committees, as laid down in a further new clause. Here again the Opposition welcomed a clause which improved the position of steel consumers, but doubted whether consumers' councils would ever really satisfactorily take the place of competitive enterprise.

One of the best debates on the Report Stage arose on an Opposition amendment to defer the earliest possible vesting date until 1st January, 1951. The Bill provides for vesting by 1st May, 1950, which would enable the Government to nationalize the industry, on paper, before the last possible date of the next General Election.

The Opposition considered that such a controversial Act should be deferred until the country as a whole had had an opportunity of expressing its views. The Government, on the other hand, reaffirmed that there could be no delay in the nationalization of this important industry, and with its decisive majority in the House it successfully resisted the amendment.

On the final day matters of detail affecting pension rights were discussed, but time was found in the last half an hour for a brief discussion on the compensation terms. The Financial Secretary to the Treasury was prevented by the Government's own guillotine from giving a full reply, and the proceedings ended in a hubbub.

On the third reading Mr. Oliver Lyttelton moved the rejection of the Bill and in doing so complained of the way in which discussion had been curtailed. Mr. Strauss, in winding up the debate, contended that the inadequacy of the discussion was due entirely to the tactics of the Opposition. The motion was rejected and the Bill was read the third time and now goes to the Lords.

Yorkshire Board's Warning

A number of cases of fatal electric shock have occurred on farms during the stacking of hay and corn. The Yorkshire Electricity Board has urged farmers to warn their employees to keep elevators clear of overhead power lines.

COMMERCE and INDUSTRY

House Heating Experiments : Payment to Sub-Contractors

THE house heating experiments at the Building Research Station, D.S.I.R., have reached a further stage with the completion of four more houses at Abbots Langley. An investigation of warm air heating in association with open planning will be carried out in them. The introduction of more efficient methods of house heating in this country has made it possible to consider heating more of the house. This in turn frees the planner from certain restrictions and enables him to provide a more open downstairs plan. This means in practice that partitions such as those between the living room and the hall, or the dining room and the living room are omitted. The heated area totals 925 sq ft, as in the other trials, but in the present case 395 sq ft is on the ground floor and the remainder upstairs. This arrangement has made it possible to increase the sizes of the bedrooms. The kitchen is equipped with sink, cupboards, etc., and with cooker and refrigerator, gas operated in two houses and electrically operated in the others.

Illumination Design Course

The 55th Illumination Design Course, organized by the Lighting Service Bureau, will be held in the lecture theatre of the Bureau, 2, Savoy Hill, London, W.C.2, from 23rd to 27th May.

Brazilian Transformer Imports

Imports of transformers into Brazil last year were about 3,290 tons in weight, rather less than in 1947. Local manufacture has been increasing in volume and present production, according to an authoritative United States source, is about 18,000 kVA monthly. The quantity needed to meet future power requirements in Brazil is estimated at about 20,000 kVA a month for the 5 to 500 kVA distribution type, for use in residential and industrial service, and about 15,000 kVA a month for the 750 kVA and larger sizes. Transformers of the oil-immersed self-cooling type are most in use, with three-phase predominating. Whereas before the war imports of transformers came mostly from Europe, during and since the war the United States has become the principal supplier, with about 75 per cent of the total.

Mechanical Engineering Congress

The theme of this year's International Mechanical Engineering Congress, which will be held in Paris from 12th to 17th September, will be production efficiency. The papers to be presented will include "The Advancement of Production Efficiency," by Mr. A. W. Berry, director of the British Engineers' Association.

Mobile Film Lighting System

In order to make the most modern types of lighting equipment available for film companies working on location anywhere in the country, the General Electric Co., Ltd., has inaugurated a mobile hire service that brings lamps, power and technical staff to the spot at short notice. The new lighting service consists of lorries to convey the equipment and a trailer containing a diesel-electric generating plant. The trailer is self-contained and will meet output demands up to 600 A if necessary. Higher capacities, up to 2,000 or 3,000 A, can be provided by arrangement with the company.

The latest addition to the fleet is shown in the accompanying illustration. All the lighting equipment and cables can be carried in the Dodge 3-ton lorry. The 3-ton trailer carries a diesel engine direct-coupled to a d.c. dynamo with a normal output of 500 A at 115 V. All controls and meters are grouped on a switchboard on the near side of the vehicle. A governor on the

G.E.C. mobile film lighting unit

diesel engine automatically maintains the voltage constant within fine limits during changes of load.

The output can be taken either from busbars or from a set of terminals, according to the type of connectors on the cables in use. It is possible to remove the whole of the generating plant from the trailer as a single unit if this is more convenient should rail transport be necessary. The trailer and generating plant were designed and constructed to G.E.C. requirements by the Streatham Engineering Co., Ltd.

An essential element in this new lighting hire facility is the maintenance organization, centred in a special workshop. Equipment is available at 24-hour notice, and every item is checked and tested in the workshop before being sent out. Similarly, a complete overhaul and any maintenance that may be necessary are performed as soon as apparatus is returned from hire.

Yorkshire Board's New Showrooms

New electricity showrooms for the Yorkshire Electricity Board at Heckmondwike were formally opened by Lt.-Col. Granville Sharp, M.P., on 25th April. Lt.-Col. Sharp, who was introduced by Col. W. M. Lapper, chairman of the Yorkshire Electricity Board, said that the showrooms would be a useful addition to the town which was already the shopping centre for the surrounding district.

Opening of the Heckmondwike showrooms. Left to right: Mrs. Sharp, Col. W. M. Lapper, Mrs. Lapper and Lt.-Col. Granville Sharp

Power Convention Programme

Intending delegates to the British Electrical Power Convention at Torquay (13th-17th June) have now received the programme and other details of the Convention. Particulars of the meetings and social events are included and there is a good deal of information (with a street map) relating to Torquay and its many attractions. It is noted that the golf competition for the G. P. Dennis Trophy, in aid of the I.E.E. Benevolent Fund, is to take place again this year.

Annual Holidays

It is announced by the company that the Telcon Works, Greenwich, and Frequency Works, Farnborough, Kent, of the Telegraph Construction & Maintenance Co., Ltd., will be closed for the annual holidays from 23rd July to 1st August, both dates inclusive.

Payments to Sub-contractors

In certain Regions it has been the practice of regional officers of the Ministry of Works to inform nominated sub-contractors of advance payments made in respect of their work to main contractors. Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association, has informed his members that under directions from the Ministry of Works these notifications have been discontinued on the grounds that the Department has legally no direct relationship with the nominated sub-contractor and considers it to be wrong in principle for its officers to initiate notifications of this sort as a matter of course.

The Ministry says, however, that nominated sub-contractors are normally present when their work is being measured and valued or the final account prepared. If they are in any doubt they may inquire from the quantity surveyor as to the amount included in the main contractor's valuation and the information would generally be given to a sub-contractor on an informal basis.

Although responsibility for the payment of sums certified in respect of the nominated sub-contractor rests with the main contractor, the Department is always open to approach by nominated sub-contractors if money due to them is not forthcoming within a reasonable period. The Department would then be prepared to consider appropriate action.

E.I.B.A. Target

We are sorry to hear from Mr. H. S. Fothergill, secretary of the Electrical Industries Benevolent Association that the Association again failed to reach the subscription target figure in April. The amount actually received was £1,687; the monthly sum aimed at this year is £2,750. So far this year only £7,550 has come in instead of the £11,000 needed. The Radio Industry Council contributed £500 during April; other amounts of over £50 came from the Brighton Electric Circle (£85), the Hull and East Yorks Branch, E.I.B.A. (£96), the Manchester Branch (£198), the Radio Industries Club (£100) and the E.C.A. Leeds Branch (£65).

Edgware Home Appliances Exhibition

The Mayor-elect of Hendon formally opened an exhibition of home appliances, organized by Norwest Services, Ltd., on Friday last at the Express Hall, Station Road, Edgware. Among the electrical exhibitors are Hoover, Ltd., Bendix Home Appliances, Ltd., Electrolux, Ltd., J. & H. Walters, Ltd., and Woodlaw Industries, Ltd. Gas exhibits are also being shown. The exhibition closes tomorrow (Saturday).

Birmingham Street Lighting Conference

A Conference on Street Lighting, with special reference to road safety, organized by the Central England Area of the Lighting Service Bureau, will be held at the Imperial Hotel, Temple Street, Birmingham, on 18th May. This is the first street lighting conference organized by the Bureau since the removal of lighting restrictions, and the matters to be discussed will include the design of street lighting installations to meet modern requirements, and the operation and characteristics of lamps and lanterns for street lighting.

Sheet Metal Pattern Development

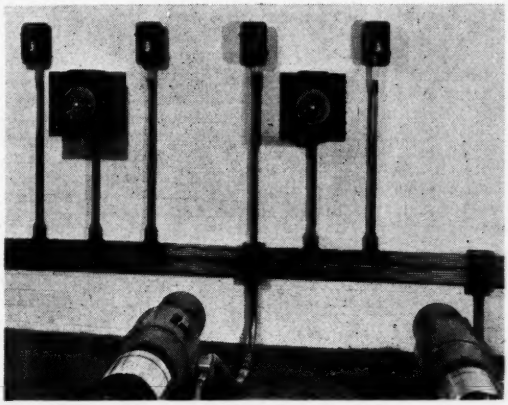
The British Standards Institution has just issued Part 1 of B.S. 1549/1949, "Methods for Sheet Metal Pattern Development." It deals primarily with assemblies in which, by reason of size, simplicity of outline or thinness of material, the neutral line may safely be ignored. In more complex structures where high dimensional accuracy is essential, bend allowance, dependent upon the neutral line, is a factor of importance and is under experimental investigation. Part 2 of the Standard will deal with the development of such shapes.

The Standard as now issued, deals with three methods of development for single curvature work by radial line, parallel line and triangulation. Twenty illustrative geometrical and calculation examples are included. Copies may be obtained from the Institution, 24-30, Gillingham Street, London, S.W.1, price 3s post free.

Channel Conduit

It is announced that the assets and goodwill of Channel Conduits, Ltd., have been purchased by Channel Conduits (1949), Ltd., 11, Victoria Street, London, S.W.1, in order to continue the business of manufacturing and marketing the "Channel" patented "spring capped" electrical conduit.

Recent installations are those in Belfort House and Lacon House, Theobalds Road, Holborn, where the conduit has been used to house the bell and telephone wiring and is installed as a recessed system flush with the floor; and at the film recording studios of G. H. W. Productions, Ltd., Boreham Wood.



"Channel" conduit installed in the motor control room of G. H. W. Productions, Ltd., film recording studios, Boreham Wood

Aberdare Cables South African Factory

A new £400,000 South African factory sponsored by Aberdare Cables of South Wales will be officially opened at Port Elizabeth on 17th May by Dr. T. E. Donges, K.C., M.P. The opening will be broadcast to the headquarters of the South Wales company where a ceremony will be held at which the chairman of Aberdare Council Committee, Mr. T. Williams, and

Mr. H. de C. Falle, Aberdare Cables sales manager, will speak by radio-telephone to Port Elizabeth. Although it will be closely associated with Aberdare Cables of South Wales, the new company, Aberdare Cables of South Africa, Ltd., will employ South African capital, labour and raw materials. When in full production approximately 600 people will be employed, and the annual value of cable produced will exceed £2,000,000. The opening ceremony will be attended by representatives of the Association of Municipal Electrical Engineers who will be in Port Elizabeth for their Conference.

Wood-pole Decay

In its advertisement in our issue of 18th February, Cobra (Wood Treatment), Ltd., stated that "recent expert examination of lines throughout the country disclosed that over 30 per cent are already attacked by decay." The company says that the figure should have been 20 per cent.

Threshing Fatality

During threshing operations at Birthorpe, Lincs, a farm worker received a fatal electric shock when an elevator came in contact with high-voltage overhead lines. The jury at the inquest, returning a verdict of "Accidental death," added a rider that where electric power cables passed over stackyards they should be heavily guarded or adequately insulated.

Electric Cookers in New Houses

The British Electrical Development Association has been informed by the Ministry of Health that no objection will be raised to the installation of supplementary electric cookers in new houses where solid fuel cookers are already fitted, and that this decision will apply to all parts of the country.

Change of Address

From 16th May the Chief Engineer's Department of the Yorkshire Electricity Board will be at the Board's headquarters, Weatherby Road, Scarcroft, Leeds (telephone No. 58275).

Trade Announcements

Ekco-Ensign Electric, Ltd., have appointed Mr. R. H. Fell as their representative in London, E.C. and W.C. districts. His addresses are Flat 5, 61, Greencroft Gardens, N.W.6 (Tel. Maida Vale 6808), or the company's London office, 5, Vigo Street, W.1 (Telephone Regent 2601).

Scottish Electric, Ltd., has removed to Dunsinane Avenue, Industrial Estate, Dundee.

The telephone number of **G. S. Peckham & Co., Ltd.,** has been changed to Temple Bar 7171.

Demonstration showrooms, sales and service advice concerning domestic clothes and dish-washing machines, have been opened by **Thor Appliances, Ltd.,** at 82, Bristol Street, Birmingham, 5, under the general supervision of Mr. H. A. Butcher (telephone: Birmingham Midland 5968).

Associated Technical Manufacturers, Ltd., announce that they have obtained additional accommodation and are now carrying stocks of "Permanoid" cables, flexibles and sleevings at their London office at Abbey House, Victoria Street, S.W.1 (Telephone: Abbey 4014).

Change of Name

Electrical & General Accessories (Leicester), Ltd., has changed its name to Ega Electric, Ltd.

Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Priced catalogue of Pirelli-General wires, cables and flexible cords.

Automatic Telephone & Electric Co., Ltd., Strowger Works, Liverpool, 7.—Technical brochure on telephone line testing equipment.

T. B. Morley & Co., Ltd., Jameson Street, Hull.—Folder illustrating the company's showrooms at Hull and indicating the range of products marketed.

Alliance Wholesale, Ltd., 62/63, Great Russell Street, London, W.C.1. — Priced catalogue of cables, flexibles, wires and associated accessories.

Browning's Electric Co., Ltd., Boleyn Castle, Green Street, London, E.13.—Priced folder on the "Browleco" industrial soldering iron and a brochure outlining the company's history, its products, and facilities available for the repair and maintenance of electrical machines.

Radiovisor Parent, Ltd., 1, Stanhope Street, London, N.W.1.—Four descriptive folders on an industrial smoke indicator and other photo-electric devices.

The Warm-Glow Co., Ltd., Leigh-on-Sea, Essex.—Folder on washable electric blankets.

Thorn Electrical Industries, Ltd., 105, Judd Street, London, W.C.1.—Illustrated folder on the "Mary Ann" electric food mixer.

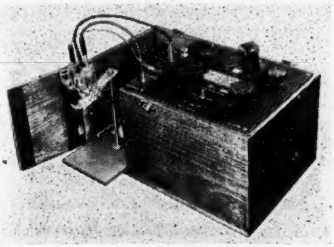
Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4.—Catalogue No. 2202 of industrial fans, exhausting and blowing equipment.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

pH Meters

IMPROVED potentiometric pH meters made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, incorporate a patented circuit in

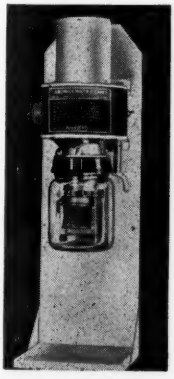


G.E.C. portable pH meter

which the number of controls needing adjustment during use has been reduced to three without adversely affecting the accuracy, permanence of calibration and robustness usually associated with this type of instrument. They are calibrated over the range 0-14 pH units with an accuracy of 0.01 pH unit for the portable model and 0.05 pH unit for the bench model.

Watch Cleaner

A machine enabling watch or small instrument and meter parts to be thoroughly cleaned in a matter of a few minutes has been placed on the market by RUNBAKEN ELECTRICAL PRODUCTS, 71-73A, Oxford Street, Manchester, 1. Essentially it works on the principle of a metal basket containing the components or complete mechanisms which is rotated at any desired speed in various cleaning agents. Three different solutions are



Runbaken "Ardwick" watch cleaner

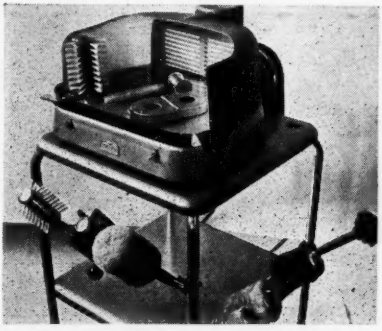
employed to clean and rinse the parts, which are finally dried in a hot-air chamber. The machine is arranged for wall mounting, finished in white or grey enamel with all fittings nickel or chromium plated, and is suitable for operation on 200/250 V a.c. or d.c. mains.

Shop Window Lighting Unit

THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, London, W.C.1, are now producing a special show window lighting unit, the "Atlas" FW/2080, for use with two 80 W 5 ft fluorescent tubes. This unit consists of an anodized aluminium reflector, suitable for ceiling fixing or suspension. To achieve maximum flexibility and to cater for restricted spaces, the control gear can be housed remotely in a convenient position. The price, with control gear, box and two tubes, is £14 10s, plus 7s purchase tax on the tubes.

Versatile Kitchen Help

The "Polvac Electric Daily Help," introduced by J. M. GLAUSER & SONS, LTD., Bridge Buildings, Bensham Manor Rd., Thornton Heath, Surrey, is now avail-



"Polvac" all-purpose kitchen aid

able in three models. The first is simply a shoe cleaner, the second is suitable for cleaning cutlery, wire-brushing aluminium kitchen-ware, polishing table glasses, sharpening knives, etc., while the third combines both machines.

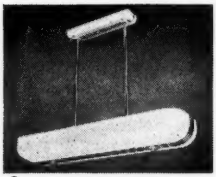
Hand Vacuum Cleaner

The reintroduction of the "Duco" hand vacuum cleaner for cleaning stairs, curtains, car and furniture upholsterings, etc., is announced by BROWN BROTHERS, LTD., Great Eastern Street, London, E.C.2. Design modifications include the fitting of

an all-rubber moulded nozzle in the mouth of which is embodied a small brush to facilitate removal of particularly stubborn particles. The retail price is £5 plus purchase tax. Weight 5 lb.

Fitting for 2ft Fluorescent Lamps

A domestic and small commercial lighting fitting employing two 2ft 40 W lamps has been brought out by FALK, STADELMANN & CO., LTD., 89-93, Farringdon Road, London, E.C.1, under the name "Derwent" 2240. Brightly coloured raised bands on a translucent white opal "Perspex" dish, with stems and finials chromium plated give the fitting an attractive appearance.



"Derwent" fluorescent lighting fitting

Serving Trolley

The new sideboard model "Electric Hostess" LGH 1100, retailing at 9gn plus purchase tax, has been specially developed by L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, London, W.C.2, as the result of a consistent demand created by the trolley type. It has four separate removable "Pyrex" food containers (2 pints each) fitted with copper lids heavily chromium plated, and there is a large hot cupboard for warming plates, dishes and additional food. Cord-switch control is provided.

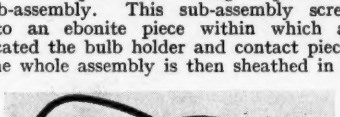
Earth Leakage Circuit Breakers

An earth leakage circuit breaker for the protection of domestic installations, introduced by W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., 51-53, Hatton Garden, London, E.C.1, incorporates a novel method of operation without delicate mechanisms. It operates from mains voltage by means of an integral relay system, the earth leakage current being used only for the closing of a secondary circuit connected direct to the mains which opens the circuit breaker. The device complies fully with B.S. No. 842: 1939, is rated at 30 A 250 V and is set for a tripping current of 20/23 mA. It is housed in a black moulded case 5⅝ in long, 4¼ in wide and 3⅜ in deep, with a removable cover, and is provided with a test button for checking the tripping mechanism and the continuity of the earth conductor between the unit itself and earth.

Henley earth leakage circuit breaker

Head Lamp

A general-purpose head lamp manufactured by the CONCORDIA ELECTRIC SAFETY LAMP CO., LTD., Luma Works, Cardiff, comprises two main assemblies—a headpiece with head straps and a battery case complete with switch. To keep the headpiece as light as possible, no overall body is fitted round the reflector lens and contact components; the silver plated reflector, gasket and "Perspex" lens being a permanent sub-assembly. This sub-assembly screws into an ebonite piece within which are located the bulb holder and contact pieces. The whole assembly is then sheathed in an ebonite tube. The weight of the complete lamp, battery, flex and webbing is 1½ lb.



Concordia head lamp

Protective Coating

A plastic composition specially designed as a protective corrosion-resistant coating for delicate metallic articles and components has just been placed on the market by CLEAR GLASS PRODUCTS, LTD., 16-18, Malvern Road, Southampton. This "Avigel 100" is applied by brushing or spraying and forms a tough resilient coating, which can be readily stripped from the object covered. It is transparent, non-inflammable and is available in various colours.

Floor Polishers

As an alternative to the de luxe chromium-plated model, the "Juno" floor polisher is now being offered by the TRUVOX ENGINEERING CO., LTD., Truvox House, Exhibition Grounds, Wembley, Middlesex, in an attractive chocolate brown stove-enamelled finish with cream rubber buffer, a brown handle grip and connecting cord. The list price is 15gn, plus £3 18s 9d p.t.

"Forgotten Corners"

Cultivation of Smaller Markets

By H. CATLEEN
D.Sc. (Econ.)

THE last six months have seen the average-sized manufacturer encountering rising difficulties in a number of the larger overseas markets. The main reasons for this trend are more competition from other export countries; flooded markets; import licence difficulties resulting from currency shortages abroad; higher customs tariffs to protect home industries abroad—a trend in practically all the big markets.

These difficulties bar the steady export development of many British manufacturers who have concentrated during the past three years on the well-known and big territories only.

As soon as the war ended, many of the not-so-big manufacturers decided to export in a systematic way. Others were content to try their chances through export houses and what is called "haphazard" or "coincidental" export. The systematic ones, however, explored as a first step the possibilities of "doorstep" exports—that is, to European and some Mediterranean territories. From there they turned their attention to the United States, South Africa, Canada, Hindustan, Pakistan, Australia and New Zealand—generally in that order.

After that, and often simultaneously, a few well-known smaller markets were worked through, such as the British West Indies with their many opportunities, and British possessions in Africa, such as Kenya, etc.

Limitations of Existing Outlets

According to the statistics, almost all of the above-mentioned markets have so far yielded satisfactory export crops for many British manufacturers, but in very few cases can the turnover figures achieved be stepped up any further. On the other hand, as the British national economy needs still higher figures for reasons known to all, it is highly advisable now for the average manufacturer to turn to less-explored territories. Does he realize how many smaller markets, even inside the Empire, he has not touched yet? Can he estimate approximately the possibilities for his products in such "unknown" territories.

A systematic combing through of all accessible territories all over the world is the foremost necessity for every manufacturer now, after he has established connections with the well-known markets. Here is an example which will illustrate the position most clearly:—

Potential Customers

The 1948 British Industries Fair was visited by buyers from—amongst many others—the following lesser-known territories: Antigua, Aruba, Azores, Bahrein Islands, Bermuda, British Honduras, Cap Verde Islands, Cayman Islands, Dominica, Ethiopia, Fiji Islands, Gambia, Granada, Mauritius, Porto Rico, Réunion, St. Vincent, Tobago, Turk's Islands, and Virgin Islands. These visitors spent a lot of time and money, and travelled far in order to buy British, and their visits serve as proof that many a manufacturer is bound to find a number of untapped markets even in the above short list.

But there are other still less-known markets, e.g., the British possessions in the Archipelago of the South Pacific, the Samoa and Cook Islands, or the Andaman or Nicobar Islands in the Indian Ocean, to mention a few, and there are more than a hundred such smaller outlets.

There are very obvious advantages in exporting to places off the beaten track. The most important is that there is less competition. The number of possible importers and import agents is smaller and, therefore, everyone's reputation is better known. Orders will be smaller, but there will be less danger of a suddenly flooded market. A manufacturer might offer products hitherto unknown there and thus become first in the field.

Institute of Transport

The first post-war Congress of the Institute of Transport will be held at Buxton from 22nd to 24th June next.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Johnson & Phillips, Ltd., report that the trading profit of the group, which includes the subsidiary companies in South Africa and Australia, is £634,595, and after providing for taxation, interest, depreciation, pensions, etc., there is a net profit of £239,181, to which is added £144,782 brought in, making £383,963. Reserves receive £172,598, and it is proposed to pay a final dividend of 7½ per cent, making 15 per cent for the year, leaving £123,337 to be carried forward. Comparative figures for the previous year are not shown, as direct comparison would be misleading.

The company received £888,750 in Electricity Stock by way of compensation for the three electricity supply subsidiaries which were acquired by the British Electricity Authority. This stock was sold for £899,302, the money being used to reduce the company's bank overdraft and to finance current business requirements. As already announced, it is proposed to capitalize £266,750 from the profit resulting from the disposal of these undertakings and to allot to shareholders one new share for every four shares held.

The Scottish group profit and loss account, which covers a period of twenty-one months to 31st December last as regards Aurora Lamps, Ltd., and a period of sixteen months as regards British National Electrics, Ltd., shows a trading profit of £33,598, to which is added £4,922 brought in. After providing for taxation, depreciation, etc., dividend on preference shares to outside shareholders, and placing £9,069 to reserve, there is a balance of £5,279.

Babcock & Wilcox, Ltd., report consolidated trading profits for 1948 of £2,167,544, as compared with £1,505,760 for 1947, plus dividends on investments, £61,101, interest on investments, £29,904, and war losses (amount recovered) £348, making £2,258,897. After providing for depreciation, taxation, etc., the net profit attributable to Babcock & Wilcox is £858,771 (against £543,147). General reserves receive £512,001, and it is proposed to pay a final dividend of 7 per cent, and a bonus of 3 per cent, again making 15 per cent, less tax, for the year. The balance carried forward is £164,238 (against £161,909 brought in).

In his statement issued with the report and accounts Col. Sir John Greenly (chairman) draws attention to the increase in the figure for stock of merchandise and work in progress, and also to the amounts owing by subsidiary companies. These rises are reflected in the consolidated increase in the overdraft at the bank, which is in large part due to the necessity of financing many large contracts at inflated costs. He refers to the heavy and increasing cost of post-war replacements and says that so far as can be seen there is no indication of prices falling in the near future. The company has therefore taken steps in this year's balance sheet to make provision as far as practicable, and, in spite of the excessively high level of taxation, to meet the problem which confronts the company in this respect.

C. A. Parsons & Co., Ltd., in a preliminary statement, show a net profit for 1948 of £178,735, as compared with £139,597 for 1947. A dividend of 12½ per cent for the year is again paid on the ordinary capital, the final distribution being 7½ per cent. After allocating £100,000 to reserves, the balance carried forward is £127,871 (against £103,596 brought in). At the annual meeting the directors will ask for consent to the company's extending its borrowing powers by £1,000,000 beyond the limit of £2,000,000.

The Power Securities Corporation, Ltd., shows a consolidated profit for 1948 of £366,266, as compared with £267,178 for 1947, to which is added investment income of £12,637, making £378,903. The concolidated net profit is £128,677 (against £97,513), of which £60,628 is dealt with in the accounts of the holding company and £68,049 retained by subsidiary companies. To this is added £106,747 brought in, and £56,933 taxation over-provided or recoverable, making £292,357. Reserves receive £106,370, and it is proposed to pay an ordinary dividend for the year of 6 per cent (same), leaving a balance to be carried forward of £132,473 (£64,527 in the holding company and £67,946 in subsidiaries).

R. B. Pullin & Co., Ltd., report a trading profit of the parent company for the year ended 30th September last, before taxation, of £32,925, as compared with £13,784 for the preceding year. The group trading profit, before taxation, is £6,615. The dividend for the year is maintained at 10 per cent.

Newman Industries, Ltd., reports a net profit for the period 4th January, 1948, to 1st January, 1949, of £85,628, as compared with £131,610 for the preceding year, to which is added provision for contingencies no longer required of £25,140 and £47,773 brought in, making £158,541. Taxation requires £47,650, and £12,735 is placed to

capital redemption reserve. The final ordinary dividend is 10 per cent (against 15 per cent), making 17½ per cent for the year (against 22½ per cent, including a bonus of 2½ per cent), and the balance carried forward is £63,113.

The Metropolitan Electric Cable & Construction Co., Ltd., reports a profit for 1948, before tax, of £92,269, as compared with £121,124 for the preceding year, to which is added £64,985 brought in. A sum of £50,000 is allocated to tax provision and general reserve receives £8,000. It is proposed to pay a final ordinary dividend of 5 per cent, again making 15 per cent for the year. The balance carried forward is £93,904.

The Calcutta Electric Supply Corporation, Ltd., in a preliminary statement, shows a gross revenue for 1948 of £3,367,245, as compared with £2,776,732 for 1947, and a net revenue of £1,024,528 (against £879,937). It is proposed to pay a final ordinary dividend of 3 per cent, free of tax, again making 6 per cent, free of tax, for the year.

The Ever Ready Co. (Great Britain), Ltd., reports a trading profit for the year ended 28th February of £632,406, which with other income makes a total of £707,233. The Companies Act, 1948, and the various changes in accounting make it impossible to give comparative figures for the preceding year. The net profit for the year is £537,919, and it is proposed to maintain the ordinary dividend at 40 per cent. Reserve receives £100,000, staff benevolent fund £14,000 and the balance carried forward is £118,414 (against £118,656).

Ever Ready (Ireland), Ltd., reports a trading profit for the year ended 31st March last of £13,997, as compared with £19,298 for the preceding year. After placing £3,664 to reserve and making other provisions, it is proposed to maintain the ordinary dividend for the year at 12½ per cent (on larger capital). The balance carried forward is £5,596 (against £7,628 brought in).

Heatrae, Ltd., reports a net profit for the year ended 28th February last of £11,637, as compared with £22,692 for the previous year. The ordinary dividend for the year is unchanged at 12½ per cent.

Hall Telephone Accessories, Ltd., is again paying a dividend for the year of 10 per cent.

Tube Investments, Ltd., has declared an unchanged interim ordinary dividend of 12½ per cent, actual, less tax, and at the same rate relatively on the liaison ordinary shares.

Lightalloys, Ltd., has declared an interim dividend of 5 per cent less tax.

New Companies

Ward Electrical (Contracts), Ltd.—Registered 2nd May. Capital £1,000. Radio, electrical and mechanical engineers, etc. S. I. Lipman is first and permanent director. Solicitors: Canter Hellyar & Co., 3-4, Lincoln's Inn Fields, W.C.2.

Dial Electrical Co., Ltd.—Registered 30th April. Capital £100. Manufacturers and sellers of electrical motors and accessories therefor, etc. Directors: K. Aldcroft, S. V. Divers, Mrs. Anne E. Aldcroft, and N. H. Brundrett. Regd. office: 1, The Crescent, Hale Road, Hale Barns, Ches.

B. E. Dearden & Co., Ltd.—Registered 30th April. Capital £2,500. Electrical engineers and contractors, automobile and marine engineers, manufacturers of and dealers in dynamos, motors, wireless, etc. Directors: B. E. Dearden, Mrs. Connie L. Dearden, T. G. Fenn and Mrs. Edith M. Fenn. Regd. office: 102, Chertsey Road, Woking.

B. C. C. (Sales), Ltd.—Registered 20th April. Capital £1,000. Dealers in and manufacturers and designers of radio and television, transmitting and receiving sets and equipment, etc. Subscribers: Princes Realisations, Ltd., and Checkendon Investments, Ltd. Solicitors: Titmuss Sainer & Webb, 61, Carey Street, W.C.2.

Bolton & Airey, Ltd.—Registered 31st March. Capital £2,500. To acquire the business of radio sales and service and electrical contractors carried on by A. F. Bolton and J. A. Airey at Oxford. Directors: A. F. Bolton and J. A. Airey. Registered office: 25, St. Clement's Street, Oxford.

Hirelite, Ltd.—Registered 20th April. Capital £100. Manufacturers, merchants and hirers of electrical apparatus and accessories, etc. Directors: J. M. Hawkins and R. G. Chinn, both directors of Mortimer Gall & Co., Ltd. Regd. office: 115-117, Cannon Street, E.C.4.

Increase of Capital

Westinghouse Brake & Signal Co., Ltd.—Increased by £300,000, in £1 shares, beyond the registered capital of £1,200,000.

Liquidations

P.H. British Electrical Works, Ltd.—Winding up voluntarily. Liquidator, Mr. G. H. Field, Hollingsworth Works, Martell Road, West Dulwich, London, S.E.21.

Bankruptcies

G. Maddison, residing at 88, Lea Street, Kidderminster, and carrying on business at Church Street, Kidderminster, electrician.—Receiving order made 28th April on debtor's own petition.

STOCKS and SHARES

STOCK EXCHANGE markets continue to pursue a quiet and fairly orderly course. Business in most of the markets is at a low ebb. The spate of new issues has been checked, but it is known that many fresh offers of stocks and shares are only waiting for a propitious moment in order to put in an appearance. The changes in prices since a week ago are mostly upward. International Combustion at 47s 6d are 3s 9d higher; Tube Investments gained 2s 6d at 6¼, and electrical equipment shares are mostly better. Rises have occurred in General Electric, 88s 6d, Associated Electrical, 77s 6d, Crompton Parkinsons, 27s. On the other hand, British Electric Traction deferred at 1795 is 30 points lower.

Cable & Wireless

Cable & Wireless ordinary stock has recovered to 233 from the relapse to 224½ which followed the speech of the chairman at the meeting a fortnight ago, when he said that there was no intention of winding up the company. Instead, a scheme is being prepared for submission to the proprietors. People who expected that there would be an immediate substantial payment on the ordinary stock are rather disappointed for the time being. The preference shareholders are relieved of any immediate prospect of their holding being paid off at par, but the price of the stock fell 2½, to 118½.

Dividends and Reports

Hall Telephone Accessories' preliminary figures help to confirm the impression created earlier by Ericsson Telephones' remarkable expansion. The company has carried on the previous year's recovery by virtually doubling the net profit for 1948. Dividend is kept at 10 per cent, which gives an 8 per cent yield on the 10s shares at 12s 6d, which is 1/6 better on the week. Automatic Telephones' results are expected before the end of the month. Calcutta Electrics improved to 29s 6d on the report of higher profits: they yield the equivalent of 7¼ per cent gross on the 6 per cent tax-free payment. Newman Industries 2s ordinary are dull, at 5s 3d, on the cut in the year's dividend from 22½ to 17½ per cent. Yield is now 6¾ per cent. C. A. Parsons ordinary at 62s 6d pay just 4 per cent on the dividend, maintained at 12½ per cent.

Johnson & Phillips Advance

After reacting to 78s 9d from the 7s 6d rise which followed the company's free bonus announcement, Johnson & Phillips £1 ordinary have picked up to 81s 3d since the appearance last week of the annual accounts. These cannot properly be compared with last year's, but made by themselves, however, a decidedly satisfactory market impression. Naturally, they have come up for particular consideration in relation to the bonus distribution.

Johnson & Phillips' capital bonus proposal has given a working basis to the controversy aroused by the Budget concessions which made such issues again practicable. Out of the company's net profit of £239,000, the 15 per cent dividend on existing capital required only £88,000 net. On the former figure, the extra £22,000 needed to maintain the same rate of dividend on capital increased by a quarter, could be found with plenty still to spare. At this point, the dividend limitation principle intervenes with its stipulation that the amount of money (not the rate per cent) is the relevant item, implying an appropriate reduction in the rate if the size of capital is increased. Other things being equal, dividend policy accordingly seems to be the determining factor.

Electric Cable Profits

Results already published this year by companies in the cable manufacturing industry have established the shares among the clearest favourites in the industrial market. They have also raised high expectations of the 1948 accounts still to come from British Insulated Callender's and others. Of the figures announced so far, Telegraph Construction's net profits (after tax) of two-and-a-half times last year's was outstanding: they raised the earnings on the ordinary capital to 34½ per cent, against the 10 per cent distributed. Henley's Telegraph Works high post-war expansion materialized in 1947, when the net profit was more than doubled, and was well maintained last year. Johnson & Phillips' results add further to the excellent record.

Contangoes Again?

The Stock Exchange Council have passed rules which, if confirmed next Monday, will come into force at once, whereby the pre-war system of carry-over facilities will be re-introduced. Stripped of technicalities, the system is simply that a buyer of shares who does not wish to pay for them can signify his wish to carry them over at the following fortnightly settlement, provided he can find someone who will lend him the money, or consent to take in the shares, for the ensuing fortnight. This is the contango, the carry-over, and buyers usually pay a rate of interest for the use of the money which they are not called upon to put up. The effect is to encourage speculation, thereby increasing activity in the markets, and, as a further consequence, serving to render dealing easier both for buyer and seller.

Electricity Supply

Shoreham Harbour Bill Opposed : Farm Electrification

EAST SUSSEX COUNTY COUNCIL last week decided to oppose the Bill which is being promoted by the Shoreham Harbour Trustees in connection with the proposed harbour works. These include the widening and deepening of the channel to the power station coal wharves to enable 4,000-ton colliers to be accommodated. Opposition is on the grounds of possible erosion along the coast east of the harbour.

Brighton and Hove Corporations and Portslade and Shoreham Urban District Councils are also opposing the Bill. Hove Legal and Parliamentary Committee drew attention to the provision in the Bill to alter the constitution of the Harbour Trustees by the appointment of four British Electricity Authority representatives and two from the South Eastern Gas Board. The effect would be that the representation of local authorities, who were the guaranteeing authorities, would be less than that of other appointing bodies.

Country Estate Electrification

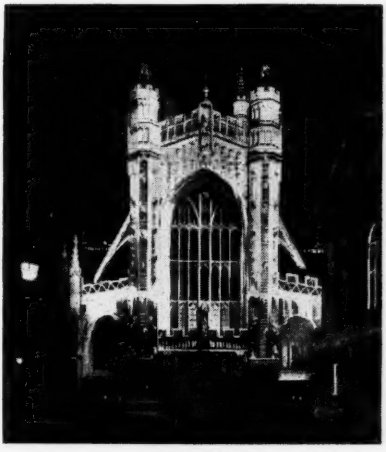
Speaking at the opening of a three-day electrical exhibition at Bugthorpe, Yorks, last week, Lord Halifax referred to a plan to electrify the whole of the Garrowby Estate. He said that the Estate had agreed to make a contribution towards the cost. When he had been in the United States he had been struck more than anything by the fact that people living in country districts had as good electricity supplies as those in large towns. Mr. D. Bellamy, manager of the Hull Sub-Area of the Yorkshire Electricity Board, spoke of the Garrowby scheme as a test whether electricity could be supplied economically to country places of that nature.

Overhead Line Policy

The Northumberland Planning Committee, in a report to the County Council, refers to the general policy governing the approval of overhead lines. The principle formulated by the Control of Development Sub-Committee is that approval will not be given where overhead lines would be harmful to amenities and where it would be practicable to lay underground cables or use an alternative route. Following complaints about the effect of this policy on supplies to some areas a meeting was held with representatives of the North-Eastern Electricity Board. The report states that no reason transpired for modifying the principle, adding that many of the difficulties previously encountered are now being overcome as a result of early consultations between the county planning officer and the Electricity Board's technical officers.

Floodlighting at Bath

Many well-known buildings at Bath will again be floodlit throughout the Bath Assembly from 15th to 28th May. The display will include the Abbey Tower and



Bath Abbey floodlit

West Front; Holburne Museum; Pulteney Bridge and City Weir; Prior Park College; Pump Room; Sham Castle; and St. Stephen's Church. This is the second occasion since lighting restrictions were relaxed that flood-lighting on a large scale has been undertaken at Bath. The first was on 2nd April when the South Western Electricity Board welcomed the relaxations by illuminating prominent buildings in its area.

I.o.M. Diesel Station

The Lieutenant-Governor of the Isle of Man (Sir Geoffrey Bromet) has given permission for the I.o.M. Electricity Board to proceed with its scheme for establishing a diesel power station. The Board, which at present takes a bulk supply from Douglas Corporation, estimates that it will save £25,000 a year by having its own gener-

ating station. Sir Geoffrey Bromet, announcing his decision, said the Board applied to him under the Isle of Man Electric Light and Power Act, 1932, for approval to construct a 6,000 kW diesel station. Stevenson & McGuffie, of Glasgow, were invited to investigate and report on the scheme, and Mr. McGuffie's report fully supported the proposals of the Board and the figures on which they were based. As already announced (6th May issue, p. 787) the Board has placed an order with Associated British Oil Engines, Ltd., and the Brush Electrical Engineering Co., Ltd., for the generating plant and switchgear. The new power station will be at Peel, which is approximately in the centre of the area of supply.

Disused Camp Lines

Thingoe Rural District Council has passed a resolution calling attention to the apparent lack of co-operation as a result of which lines originally erected to supply camps, aerodromes, etc., many of which are now disused, are withheld from use by the Electricity Board for the benefit of local inhabitants and agriculture. The resolution also points to the hardship arising from the demands of the Electricity Board for capital contributions from potential consumers. Examples were quoted in which sums of as much as £850 were asked for.

Electricity Output

The Ministry of Fuel and Power statement for the week ended 29th April shows that 829.7 million kWh was sent out for public supply from solid-fuel-fired stations, as compared with 692.3 million kWh in the preceding week and 775.1 million for the week ended 30th April, 1948.

Rural Policy in East Midlands

Addressing chairmen and secretaries of the county branches of the National Farmers' Union in Nottingham on 4th May, Mr. C. R. King, chairman of the East Midlands Electricity Board, explained the interim policy of the Board regarding rural development with particular reference to farming supplies.

As a general rule, he said, the Board was opposed to large capital contributions from potential consumers and considered that the situation could best be met by the consumer guaranteeing a certain revenue per annum for a period of years. The money consumers saved by not making a capital contribution could best be spent on the electrical installations at the farm, and thus adequate use of the supply would be assured. He regretted that many farmers still regarded the supply merely as an additional amenity for the farmhouse. If steps were taken to ensure that the fullest possible use was made of the supply, then the Board would be in a better position to face the large capital cost of rural extensions.

He mentioned that in the East Midlands area, which covers some 6,000 square miles, there were some 17,000 farms still to be connected, and he hoped that when materials and labour became more plentiful the rate of farm connections would rise to about 2,000 per annum from the present figure of just over 800.

Power Station in Devon

At a meeting of Bideford and District Employment Committee a scheme for the erection of a new power station at Yelland came up for discussion. It was estimated by the manager, Mr. G. F. Dickie, that 500 men would be required to work on the project over a period of four years. He understood that the authorities had been considering building a temporary camp at Yelland or taking over other camps to accommodate outside workers.

Gallery Rewiring

Manchester Corporation proposes to rewire the electric circuits in the Central Gallery. A report to the City Council states that the installation is obsolete and in an unsatisfactory condition, the wiring being in wooden capping and casing which provides no protection against fault current or fire. The rewiring will be carried out in two sections. That to be undertaken during the current year includes replacing the main distribution board, providing suitable ironclad switchgear and rewiring four of the first floor galleries.

B.E.A. Collier Markings

As they become due for repainting the British Electricity Authority's colliers are being given new funnel markings. The funnel is painted red with a black band at the top and the letters "B.E.A." in white just below the band

Manchester and Surcharge

At its May meeting Manchester City Council, by 115 votes to three, passed a resolution urging that the experiment of a winter electricity surcharge should not be repeated.

Eastern Board's Activities

In the note in our 29th April issue, relating to the first twelve months' working of the Eastern Electricity Board, the number of new substations put into service should have read 773, not 733.

Conversion of Premises

DWELLING-HOUSES USED FOR BUSINESS PURPOSES

By F. E. SUGDEN, A.C.I.S., Barrister-at-Law

AT present many electrical contractors are experiencing difficulty in obtaining suitable business premises and frequently those that are available carry too high a rental to be borne if there is any uncertainty in the business.

A possible way out is for the contractor to take premises protected by the Rent Restriction Act and reconstruct them, with the landlord's permission of course. In doing so he will take them outside the Rent Restriction Act. Or he may take a house which was originally a dwelling-house and without making any structural alterations but by virtue of fresh terms in the tenancy use it for business premises. There have been several cases before the Courts in connection with these matters.

Action for Possession

In one case, by agreement of tenancy the predecessor of the plaintiff let the defendant, at a yearly rent, premises consisting of a shop and dwelling-house which was protected by the Rent Restriction Act. The defendant took possession of the premises under the agreement and for a period he and his wife and son lived in the residential portion and carried on business in the shop. Eventually they removed to another house but continued to carry on business and to have meals at the premises. This continued for a considerable time and stock and empties were kept in the residential rooms. The plaintiff brought an action for recovery of possession of the premises on the grounds they had ceased to be a dwelling-house and had become entirely business premises. The Court held that although there had been no structural alterations the contention of the plaintiff was correct and he was entitled to possession.

In my opinion the defendant should have admitted that the premises had ceased to be used for residential purposes and were being used for business only and immediately he received a notice to quit, which obviously he did, he should have applied for a new lease in accordance with the Landlord and Tenant Act, 1927. No doubt he would have obtained this and thus would have been in a better position than being covered by the Rent Restriction Act because if he wished to sell the goodwill of his business he could have done so with a new lease attached.

In another case, at the date of the Rent Restriction Act there were in existence three separate dwelling-houses; they were all let and were covered by the Rent Restriction Act, and so they remained until the owner obtained vacant possession. Incidentally, this case took place before the commencement of the late war and thus the premises were de-controlled.

The owner of the premises converted them into a factory, and in the case in question the Judge stated there was no suggestion of any merely colourable alteration made with a view to evading the statute. It was a bona fide conversion by the owner at very considerable expense.

Question of Rent

The new tenants were prepared to take a lease of this factory for 21 years at a rent of £700 a year. When they had done this and paid a half a year's rent, it occurred to them that though they had agreed to pay £700 a year, the Rent Restriction Act relieved them from liability to pay more than the standard rent of each of the three dwelling-houses and this, they contended, enabled them to recover any surplus paid by them above that amount. They therefore brought an action in the County Court where the Judge gave judgment in their favour for recovery. The landlord appealed to the Divisional Court and the County Court Judge's decision was reversed and, finally, not satisfied with that, the tenants went to the Court of Appeal. The Court of Appeal held that in view of the structural alterations the three houses had been taken outside the control of the Rent Restriction Act and

the landlord could charge what rent he could get from the tenant.

It will thus be seen that if an electrical contractor wants to expand his business and there is a house next door to his present establishment, or he desires to move his business to another area where there are only large dwelling-houses available or a series of them protected by the Rent Restriction Act, if he obtains possession he can convert them into business premises if he obtains the permission of the local authority to make the necessary alterations. But immediately these alterations are made these premises are taken outside the Rent Restriction Act. Again this is important because if he is a tenant and he desires to obtain a new lease under the Landlord and Tenant Act, 1927, provided he fulfils specific requirements he can do so.

I may quote another case which will apply if a contractor has a shop for business or showroom purposes and he allows his manager to live over the shop. A limited company was the leaseholder of a shop with living rooms above in which their manager resided for the purposes of the business. On the expiration of the lease the landlord claimed possession. The company claimed that it was protected by the Rent Restriction Act as the premises were in the occupation of their manager. The Court held that it was not so protected because the premises were used purely for business.

Swiss Electrical Imports

IMPORTS of electrical goods into Switzerland last year increased in all groups. Notably above the level of 1947 were accumulators, the telephone and telegraph group, cable, and meters and measuring instruments. It should be added that Switzerland is a far larger exporter than importer of the last named, as also she is of power plant (six times as large) and of much unspecified apparatus. There was no widespread change in the relative shares of the countries participating in supply except for the reappearance of Germany in certain lines. (17 Swiss francs = £1.)

Sources of Imports	1948 Sw. fcs. (000)	Inc. or dec. on 1947 Sw. fcs. (000)
Accumulators	1,688	+ 794
From United States	483	+ 168
,, *France*	580	+ 325
,, *Sweden*	392	+ 196
,, *Britain*	145	+ 81
Insulators	1,134	+ 437
From France	247	+ 170
,, *Denmark*	650	+ 167
,, *United States*	195	+ 162
Meters and measuring instruments	3,584	+ 1,427
From United States	1,538	+ 283
,, *France*	636	+ 425
,, *Britain*	454	+ 152
,, *Sweden*	120	+ 92
Telephone and telegraph app.	9,980	+ 2,324
From Belgium	6,759	+ 2454
,, *Britain*	672	− 315
,, *Holland*	1,292	+ 637
,, *United States*	410	− 814
Radio apparatus	15,590	+ 11
From Britain	2,281	+ 589
,, *Holland*	2,805	− 1,360
,, *Hungary*	489	− 137
,, *France*	573	+ 89
,, *United States*	7,799	+ 820
,, *Sweden*	558	+ 27
Glass rectifiers	212	+ 44
From Holland	88	+ 7
Insulated wire and cable	1,860	+ 687
From Holland	179	+ 41
,, *Belgium*	493	+ 82
,, *Britain*	200	+ 104
,, *United States*	411	+ 201

Sources of Imports	1948 Sw. fcs. (000)	Inc. or dec. on 1947 Sw. fcs. (000)
Unspecified electrical apparatus over 500 kg.	95	+ 52
From Czechoslovakia	25	+ 25
Ditto 50 to 500 kg.	1,389	+ 1,027
From Germany	104	+ 70
,, *Holland*	81	+ 5
,, *Britain*	60	+ 28
,, *United States*	1,007	+ 830
Ditto 3 to 50 kg.	726	+ 356
From United States	278	+ 153
,, *Germany*	67	+ 21
,, *Britain*	83	+ 46
Ditto under 3 kg	2,528	+ 135
From Italy	214	− 244
,, *Holland*	348	− 440
,, *Belgium*	142	− 78
,, *France*	142	− 26
,, *Germany*	474	+ 425
Dynamo-electric machines	10,544	+ 1,003
From Czechoslovakia	788	− 1,388
,, *Italy*	1,078	− 1,269
,, *France*	355	− 243
,, *United States*	4,702	+ 2,586
,, *Germany*	503	+ 366
,, *Britain*	1,916	+ 690
Lighting and starting equipment for vehicles	3,329	+ 119
From France	464	+ 4
,, *United States*	1,292	− 332
,, *Germany*	592	+ 219
,, *Britain*	397	+ 175
Electric incandescent lamps	6,146	+ 94
From Hungary	791	+ 139
,, *Holland*	3,601	− 784
,, *United States*	956	+ 316

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

24753/8 Hudec, E.—System for transmitting telegraph signals on electric waves. 26th August, 1937. (Cognate applications 24754/38, 24755/38, 24756/38 and 24757/38.) (621723.)

1939

15200. Muller, J.—Variable resistances for electrical measuring apparatus. 31st May, 1938. (621668.)

1941

7531. Contraves Akt.-Ges.—Apparatus for representing electrically the value of a function of a variable. 15th June, 1940. (621835.)

1943

15298. Induction Heating Corporation.—Induction heating apparatus. 26th December, 1942. (621725.)

1944

8276. Induction Heating Corporation.—Induction heating apparatus. 14th April, 1943. (Addition to 621723.) (621726.)

22500. Marconi's Wireless Telegraph Co., Ltd.—Devices having dark trace screens. 22nd July, 1942. (621729.)

25373. British Thomson-Houston Co., Ltd.—Means for controlling the starting of electric-discharge devices. 17th December, 1943. (621730.)

1945

79. British Thomson-Houston Co., Ltd.—Resilient mounting devices. 31st December, 1943. (621841.)

81. British Thomson-Houston Co., Ltd.—Selenium rectifier-unit treating apparatus. 31st December, 1943. (621731.)

9334. Marconi's Wireless Telegraph Co., Ltd.—Method of making screens. 14th April, 1944. (621842.)

9773. Carlson, V. E.—Electrical connectors. 17th August, 1942.) (621949.)

10216. Pringle, J. W. S.—Radio beacons. 23rd April, 1945. (621733.)

11731. British Thomson-Houston Co., Ltd.—Coating processes and apparatus therefore. 11th May, 1944. (721734.)

11947. Sperry Gyroscope Co., Inc.—Electrical discharge means particularly pulse-generating means and blocking oscillators for use therewith. 11th May, 1944. (621781.)

12406. British Thomson-Houston Co., Ltd., and Griffiths, L.—Ignition coils. 17th May, 1945. (621843.)

12536. British Thomson-Houston Co., Ltd.—Electromagnetic induction apparatus. 22nd May, 1944. (621674.)

12537. British Thomson-Houston Co., Ltd.—Electromagnetic induction apparatus and methods of making the same. 22nd May, 1944. (621675.)

13701. British Thomson-Houston Co., Ltd.—Methods of making curved iron cores for electromagnetic induction apparatus. 1st June, 1944. (621676.)

13775. British Thomson-Houston Co., Ltd.—Fusible electric circuit interrupting devices. 3rd June, 1944. (621844.)

14353. British Thomson-Houston Co., Ltd.—Strip cutting machines. 8th June, 1944. (621677.)

15011. British Thomson-Houston Co., Ltd., and Pool, W. J.—Electric motor control systems. 13th June, 1945. (621782.)

18150. Gall, D. C.—Apparatus for the comparison of radiation. 16th July, 1945. (621678.)

19103. Rust, N. M., and Partington, G. E.—Radar systems employing frequency modulation. 25th July, 1945. (621846.)

23122. Igranic Electric Co.. Ltd.—Drilling and like machine tools. 11th September, 1944. (621559.)

23394. British Thomson-Houston Co., Ltd.—Electromagnetic induction apparatus. 11th September, 1944. (621679.)

24016. Marconi's Wireless Telegraph Co., Ltd.—Multiple signalling system. 31st July, 1943. (621613.)

25065. Weingart, R. I. N.—Mechanical movement for a measuring instrument. 13th December, 1944. (621614.)

26489. Marconi's Wireless Telegraph Co., Ltd.—Colour television systems. 21st August, 1942. (621560.)

26759. Marconi's Wireless Telegraph Co., Ltd.—Colour television system. 12th October, 1944. (Addition to 621560.) (621561.)

26762. Partington, G. E.—Radio ranging systems. 12th October, 1945. (621848.)

27963. Valensi, G.—Method of and means for transmitting signals applicable to telecommunication installations. 16th July, 1943. (621615.)

29067. Marconi's Wireless Telegraph Co., Ltd.—Radio frequency telegraph and like communication systems. 2nd November, 1944. (621850.)

31172. Igranic Electric Co., Ltd.—Electric frequency responsive systems. 20th November, 1944. (621851.)

32670. Maschinenfabrik Oerlikon.—Thermal power plant. 10th October, 1945. (621954.)

1946

1732. British Thomson-Houston Co., Ltd., and Dixon, C. J. E.—Plug-and-socket electric connector devices. 18th January, 1946. (621683.)

2877. British Thomson-Houston Co., Ltd., Cox, H. E., and Pollard A. H.—Liquid-break electric circuit-breakers provided with arc-extinguishing means. 29th January, 1946. (621565.)

3287. British Thomson-Houston Co., Ltd.—High-frequency discharge apparatus and associated cavity resonator circuits. 23rd October, 1942. (621855.)

4726. Pelle, P.—Apparatus for measuring the distortion of start-stop telegraphic signals. 5th July, 1944. (621955.)

6434. Tilling Stevens, Ltd., Norburn, W. H. J., and Freeman, F.—Electrical apparatus or machines. 1st March, 1946. (621568.)

8936. Marconi's Wireless Telegraph Co., Ltd.—Apparatus for controlling the frequency of an oscillator. 22nd March, 1945. (621793.)

9564. Cooper, W. H. B., and Duerdoth, W. T.—Testing electrical communication systems. 27th March, 1946. (Cognate application 9911/46.) (621687.)

10438. English Electric Co., Ltd., and Woodford, C. G. A.—Alternating-current circuits and their application to electric control systems. 4th April, 1946. (621860.)

10666. Standard Telephones & Cables, Ltd.—Vacuum tube voltmeter. 9th April, 1945. (621621.)

12324. White, E. L. C.—Cathode-ray tubes employing electrostatic deflection. 24th April, 1946. (621958.)

12923. Decca Record Co., Ltd. (Fennessy, E.).—Control devices for radio transmitters. 29th April, 1946. (621748.)

13083. Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares Etablissements Claude-Paz & Silva.—Device for the starting and operating of gas-filled electric-discharge apparatus. 14th December, 1945. (Addition to 616823.) (621864.)

13680. Igranic Electric Co., Ltd.—Protective electric switches. 5th May, 1945. (621626.)

14123. Cooper, A. H.—Mechanisms for responding to predetermined electrical signals of Morse form. 10th May, 1946. (621690.)

15520. British Thomson-Houston Co., Ltd.—Terminal structures in electric heaters. 25th May, 1945. (621868.)

15678. Graseby, R. C.—Electric torque-amplifying or transmitting mechanisms. 23rd May, 1946. (621627.)

16014. Philips Lamps, Ltd.—Thermionic valve circuits for causing abrupt changes in current and/or voltage. 13th March, 1942. (6621869.)

16653. Landis & Gyr Soc. Anon.—Iron cores for induction meters. 2nd June, 1945. (621800.)

18736. Standard Telephones & Cables, Ltd., Earp, C. W., and Cleaver, R. F.—Combined radio direction and distance finding system. 21st June, 1946. (621575.)

18853. Standard Telephones & Cables, Ltd.—Radio receiving system. 21st July, 1945. (621803.)

20179. Nieboer, H. A.—Electric irons. 5th July, 1946. (621805.)

20505. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Indicating and recording apparatus. 9th July, 1946. (621752.)

20506. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Electrical timing circuits. 9th July, 1946. (621872.)

20769. Metropolitan-Vickers Electrical Co., Ltd., and Angus, A. B.—Current collecting devices for electric railway vehicles. 11th July, 1946. (621966.)

20973. Marconi's Wireless Telegraph Co., Ltd., and Easter, B.—Frequency discriminator circuit-arrangements. 12th July, 1946. (621694.)

21702. Belling & Lee, Ltd., and Strafford, F. R. W.—Aerials. 19th July, 1946. (621876.)

24469. Philips Lamps, Ltd.—Circuit-arrangement for supplying heating current for grid-controlled discharge tubes. 4th August, 1945. (621631.)

25224. Standard Telephones & Cables, Ltd., and Lee, E. C.—Electric power cables. 23rd August, 1946. (621632.)

27564. Standard Telephones & Cables, Ltd., Barnard, R. M., Stray, W. J., and Wooltorton, E.—Electrical condensers. 13th September, 1946. (621903.)

30318. Sylvania Electric Products, Inc.—Electron-discharge tubes. 14th November, 1944. (621813.)

30360. Maple & Co., Ltd., and Williams, H.—Signs comprising one or more electric-discharge tubes. 11th October, 1946. (621814.)

30674. British Thomson-Houston Co., Ltd., and Clough, F. H.—Spinning machines. 15th October, 1946. (621585.)

31055. Standard Telephones & Cables, Ltd., and Wright, E. S.—Mounting of electrical components. 18th October, 1946. (621702.)

31869. M-O Valve Co., Ltd., and Klepp, G. F.—Electron-discharge devices. 28th October, 1946. (621588.)

31953. Jack & Heintz Precision Industries, Inc.—Magneto electric machines. 1st November, 1945. (621589.)

32237. Standard Telephones & Cables, Ltd., Bray, F. H., Hartley, G. C., and Ridler, D. S.—Electrical storage of information. 30th October, 1946. (621816.)

32238. Standard Telephones & Cables, Ltd., Bray, F. H., Hartley, G. C., and Ridler, D. S.—Counting devices comprising discharge tubes. 30th October, 1946. (621817.)

33137. British Thomson-Houston Co., Ltd.—Magnetic cores. 7th November, 1945. (621704.)

33249. Igranic Electric Co., Ltd.—Apparatus for the high-frequency heating of dielectric material. 10th November, 1945. (621906.)

33302. British Thomson-Houston Co., Ltd. (General Electric Co.).—Methods of waterproofing materials. 8th November, 1946. (621970.)

33978. Western Electric Co., Inc.—Transmitting and receiving circuits for wave transmission systems. 30th January, 1943. (Addition to 575,432.) (621593.)

34234. Siemens & General Electric Railway Signal Co., Ltd., and Riddle, H. J. N.—Electrical timing circuits employing thermionic valves. 19th November, 1946. (621636.)

34775. Wright, J. T. W., and MacGiltrow, L. E.—Electrical plug-and-socket connectors. 22nd November, 1946. (621595.)

35222. British Thomson-Houston Co., Ltd., and Moir, J.—Wired radio signalling systems. 27th November, 1946. (621637.)

35521. Office Technique International O.T.I.—Electric coupling plug. 7th March, 1945. (621598.)

36549. Rimmington, F.—Electric impulse clocks and clock systems, and apparatus therefore. 11th December, 1946. (621768.)

36585. English Electric Co., Ltd., and Woodford, C. G. A.—Electrical supply systems. 11th December, 1946. (621914.)

37043. British Thomson-Houston Co., Ltd., and Clough, F. H.—Spinning machines. 16th December, 1946. (621600.)

38100. Electro Methods, Ltd., Butcher, F. E., and Waldschmidt, F.—Electromagnetic relays. 31st December, 1946. (621770.)

1947

61. Williams, F. C.—Circuit arrangements for providing control voltages from electric pulse signals. 1st January, 1947. (621921.)

214. Metalastik, Ltd., and Hirst, A. J.—Resilient mountings. 3rd January, 1947. (Cognate application 9566/47.) (621638.)

450. Static Condenser Co., Ltd., and Stanley, E. C.—High-frequency electrical heating equipment. 6th January, 1947. (621640.)

1799. Shaw, H. N.—Electrical induction heated devices. 20th January, 1947. (621926.)

2490. Foster Transformers & Switchgear, Ltd., and Jennings, R. E.—Phase-shifting apparatus for use in electrical testing and research work. 27th January, 1947. (621833.)

2515. Hazeltine Corporation.—Pulse-signal translating arrangement. 7th February, 1946. (621928.)

2822. Standard Telephones & Cables, Ltd., Wolfson, H., and Shepard, S. C.—Electric resistance bolometers. 29th January, 1947. (621605.)

5059. F.K.G. Fritz Kesselring Geratebau Akt.-Ges.—Devices for controlling electric current circuits by means of switch elements actuated magnetically. 23rd February, 1946. (621714.)

5175. British Thomson-Houston Co., Ltd., Sinclair, W. D., and Shurmer, H. V.—Lighting fittings employing tubular elongated light sources. 21st February, 1947. (621716.)

5199. Metropolitan-Vickers Electrical Co., Ltd., Fletcher, G. H., and Brown, J. K.—Electric generating equipment. 21st February, 1947. (621652.)

5255. Jones, J. E., and Worth, H. W.—Combination of identification means with means for operating audible electric signals. 24th February, 1947. (621653.)

5433. Westinghouse Electric International Co.—Electronic timing control apparatus. 18th January, 1946. (621660.)

5650. Plessey Co., Ltd.—Slide wire permeability tuning device. 26th February, 1946. (621664.)

5665. Ferranti, Ltd., and Taylor, M. K.—Electrical computing instruments. 27th February, 1947. (621665.)

5684. Standard Telephones & Cables, Ltd., and Fitch, C. K.—Process and machine for forming glass beads on wire. 27th February, 1947. (621666.)

5707. British Thomson-Houston Co., Ltd.—Control systems for electric cooking and heating apparatus. 28th February, 1946. (621720.)

5979. Westinghouse Electric International Co.—Radio frequency systems. 22nd September, 1943. (621993.)

6378. Robertson, L. D. S.—Electrically heated blankets, pads and the like. 6th March, 1947. (622000.)

6642. M-O Valve Co., Ltd., and Freeman, G. V. H.—Indirectly heated cathodes for electron-discharge devices. 10th March, 1947. (622001.)

6853. White, E. L. C., and Elbourn, R. W.—Thermionic valve circuit-arrangements. 24th April, 1946. (Cognate application 18366/46.) Divided out of 621958. (622002.)

7194. Akt.-Ges. Brown, Boveri & Cie.—Gas turbine plant in combination with at least one pressure gas producer. 12th April, 1946. (621610.)

11146. British Thomson-Houston Co., Ltd.—Electric induction apparatus. 27th April, 1946. (621721.)

1948

4256. Induction Heating Corporation.—Induction heating apparatus. 26th December, 1942. (Cognate application 4257/48.) (621776.)

23066. British Thomson-Houston Co., Ltd. (General Electric Co.).—Apparatus for the production of a smoke or fog of finely divided materials. 10th May, 1945. Divided out of 621734. (621778.)

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Barrow-in-Furness.—30th May. Education Committee. Electric lighting, heating and power installation at Greengate County Nursery School. (See this issue.)

Belfast.—3rd June. Electricity Department. Mercury arc rectifier equipments. (See this issue.)

Edinburgh.—North of Scotland Hydro-Electric Board. Lighting, heating and power installations at Fasnakyle power station and dams. (See this issue.)

Epping.—25th May. R.D.C. Duplicate electrically controlled centrifugal pumping plant for the Harlow Sewage Disposal Works. A. P. I. Cotterell & Sons, engineers, 54, Victoria Street, Westminster, S.W.1.

India.—LUCKNOW.—15th July. Public Works Department (Irrigation Branch). Plant, including three 9,500 h.p. Kaplan turbines, three 8,000 kVA generators and travelling crane, for the Pathri hydro-electric power station. (C.R.E. 8329/49. Ten/379.)*

South Africa.—JOHANNESBURG.—2nd June. South African Railways, Stores Department. Supply of 30,000ft of hard-drawn copper catenary wire. (C.R.E. (I.B.) 12477/49. Ten/377.)*

BLOEMFONTEIN.—29th June. City Electricity Department. 11 kV switchgear. (C.R.E. (I.B.) 12304/49. Ten/370.)*

Yorkshire.—North Riding Standing Joint Committee. Installation of electric lighting and small power services in new police training establishment, Northallerton. (6th May.)

* Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.

Orders Placed

Durham.—County Council. Electrical installations in police houses at Bishop Auckland and West Hartlepool; county architect, Court Lane, Durham City.

Hyde.—Lighting Committee. Installation of 99 street lighting points.—Metropolitan-Vickers.

Sheffield.—Corporation. Electrical installations in 322 houses on Littledale estate (£7,303).—R. J. Kemp & Co., Leicester.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnard Castle.—Houses (16), Ingleton and Middleton, for the R.D.C.; R. C. Williamson, Ltd., builders, West Auckland.

Bradford.—Houses (64), Eccleshill South and Clayton East; city architect, Town Hall.

Bexhill.—Flats (36) and maisonettes, Ninfield estate; borough engineer.

Houses (21), Kingswood Avenue and Glenleigh Park Road; Kingswood Estates, Ltd., builders, 28, Sea Road.

Brighton.—Dairy, offices, etc., Hanover Place and Islingwood Road; Brighton Equitable Co-operative Society, Ltd., 96, London Road.

Houses (40), Lower Bevendean estate, and 160 self-contained flats, Sylvan Hall estate; borough engineer.

Secondary school, Stanmer; schools architect, 26/30, King's Road.

Bristol.—Nine new shops at Filwood Broadway and 32 one-bedroom flats at Lawrence Weston; city architect, Eagle House.

Bury.—Secondary school, Elton; borough surveyor, Municipal Offices, 28, Bank Street.

Bushey.—Grammar school, for Herts. E.C.; Dawe and Carter, architects, High Street, Watford.

Caernarvon.—Houses (56), Maes Barcer estate; Williams & Williams, builders, Llys Merion estate.

Chester.—Research laboratory and offices; Associated Lead Manufacturers, Ltd., The Lead Works.

Chesterfield.—Additional classrooms, Whitecotes Lane School and Newbold School (£13,034); W G. Robson, Ltd., builders, Bamforth Street, Sheffield.

Colchester.—Three-storey offices, Essex Street and Wellington Street; Ministry of Works, Cambridge.

Houses (44), Shrub End site; J. Moss & Sons, builders, St. Helena Road.

Corby.—Shops (18) with living accommodation, Forest Gate estate; Blackwell & Storry, architects, Gold Street Chambers, Kettering.

Croydon.—Two-storey addition to engineering works; Taylor Engineering Co., 79, Morland Road.

Culrose.—Houses (24), R.N. Air Station; Selleck, Nicholls & Co., Ltd., builders, East Hill, St. Austell.

Darlington.—Primary school, Broadway; borough architect.

Edinburgh.—Indoor swimming baths (£100,000); city architect, City Chambers.

Epsom.—Four-storey Government offices (£60.000); Percy Bilton, Ltd., builders, 111, Park Street, London, W.1.

Essex.—Laboratory block, domestic science room, etc., at South-East Essex Technical College, and commerce block, Mid-Essex Technical College; H. Conolly, county architect, County Hall, Chelmsford.

Glasgow.—Dwellings (539), Eastwood; housing director, Trongate.

Offices, Torrisdale Street, for National Assistance Board; Ministry of Works, Edinburgh.

Gorton.—Extensions to engineering works for Follow & Bates, Ltd.; Naylor, Son and Widdows, architects, St. Mary's Gate, Derby.

Gosforth (Northumberland).—Bank premises, High Street, for the Newcastle Savings Bank, Ltd.; Marshall and Tweedy, architects, 36, Blackett Street, Newcaslte-on-Tyne.

Grimsby.—Houses (66), Wellsby Road estate; J. Bratton & Co., Ltd., builders, Cromwell Road.

Hounslow.—Factory and stores, Great West Road; M. B. Foster & Co., Ltd., 242, Marylebone Road, N.W.1.

Flats (36), in two blocks, Hounslow West site, for Heston and Isleworth T.C.; Building & Public Works Construction Co., Ltd., Swindon, Wilts.

Hyde.—Reconstruction of Alma Mills for Fletcher, Miller, Ltd.; Wellerman Bros., Ltd., builders, Edward Street, Hyde.

Ilford.—Seven-storey block of flats, Beehive Lane; borough engineer.

Block of offices, Cranbrook Road; Caspari, architect, 20, Dorset Square, N.W.1.

Keynsham.—Standard type houses (32); clerk to U.D.C., Keynsham, Somerset.

Kingston-on-Thames.—Seven shops and 12 flats, Ham Parade, Richmond Road; G. T. Crouch, Ltd., builders, 3/5, Thames Street.

Lancashire.—Residential school at Clitheroe for mentally retarded children; G. Noel Hill, county architect, Preston.

Littlehampton.—Police station, court and houses, East Street; West Sussex county architect, Chichester.

London.—LEWISHAM.—Three five-storey and three three-storey blocks of flats (131 flats), Paragon Place; M. H. Forward, borough architect.

WOOD GREEN.—Flats (18), Gladstone Avenue; Artizans & General Dwellings Co., Ltd., 1, Cromwell Road, S.W.7; M. T. E. Jackson, staff architect.

Malmesbury.—Nurses' home at District Hospital (£20,000); South Western Regional Hospital Board, Cotham Lawn Road, Bristol.

Manchester.—Primary school, Pilkington Street, Blackley; L. C. Howitt, city architect, Town Hall.

Permanent health centre; city architect.

Margate.—Houses (114), Garlinge estate extension; W. L. Armstrong, borough surveyor, 40, Grosvenor Place.

Northenden.—Secondary school, Greenwood Road, for Rev. W. Murphy, P.P. (£180,000); Reynolds & Scott, architects, 9, Albert Square, Manchester, 2.

Nottingham.—Factory, Albion Street; Midland Plastering Co., Ltd., Canal Street.

Oldbury.—School, Causeway Green, Langley; A. Culwick, town clerk, Municipal Buildings, Oldbury, near Birmingham.

Plymouth.—Factory, Seagrave Road and Wolseley Road, Milehouse; Saccone and Speed, Ltd., wine and tobacco merchants, 7, High Street, Devonport.

Poole.—Extensions to works; James Bros. (Constructional Engineers), Ltd., Station Road, Hamworthy.

Office block; Bemister Motors, Ltd., North Road, Parkstone.

Portland.—Health centres at Tophill and Underhill; B. J. Cornelius, U.D.C. surveyor, Council Offices.

Ramsgate.—School, Manston Road (£150,000); H. V. Lobb, architect, 20, Gower Street, London, W.C.1.

Reading.—Factory and offices, Basingstoke Road; Chr. Hanson's Laboratory, Ltd., 352, Strand, W.C.2.

Saltburn (York.).—Block of 42 flats; U.D.C. surveyor.

Scarborough.—Primary school, Eastfield estate, Seamer; J. Catchpole, North Riding county architect, Northallerton.

Seaham Colliery (Co. Durham).—Pithead baths for the Miners' Welfare Commission; G. Wimpey and Co., Ltd., builders, Orchard Street, Newcastle-on-Tyne.

Seaham.—Houses (112), Westlea estate, for the U.D.C. Builders: R. G. Finlay, Ltd., West Sunniside, Sunderland (90 houses); C. Yeoman, Ltd., Ryhope (10 houses); and direct labour (12 houses).

Sheffield.—Church, Broomhill; G. G. Pace, architect, 27, Front Street, Acomb, York.

School, Baslow Road, Totley; city architect, Town Hall.

Cinema, restaurant and shops, Angel Street and Bank Street, for the Associated British Cinemas, Ltd.; Architect's Dept., Colquhoun House, Broadwick Street, London, W.1.

Southampton.—Infants' school, Botley Road; R. H. Meggeson, town clerk, Civic Centre, Southampton.

Stockport.—Factory, Hawfield Street, for L. Higginbotham & Sons, Ltd., Spring Gardens; P. Peirce & Son, architects, 30, St. Petersgate, Stockport.

Sunderland.—Swimming baths and gymnasium, Bede Towers, Ryhope Road, education architect.

Surrey.—Police houses (45), various sites, for Standing Joint Committee (£93,405); R. Holford and Co., builders, Effingham, Surrey.

Tynemouth.—Houses (40), Moor Park estate; borough engineer, 19, Howard Street, North Shields.

West Ham.—School, Stratford Road, first section (£44,000); T. E. North, architect, 100, West Ham Lane, E.15.

Whitehaven.—Houses (170) for Ministry of Supply employees; borough engineer.

Wolverhampton.—Extensions to works, Goodyear Tyre & Rubber Co., Ltd.; McKeand, Smith & Co., Ltd., builders, Showell Road.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 4th May:—

GRIMSTON. No. 664,047. Class 7. Electrically operated machines for grinding, polishing, sanding, buffing, honing, scaling, wire-brushing, sheet metal cutting and valve re-facing, and parts thereof included in Class 7 and tools for use therein and electrically driven tools and tools for use therein, and parts included in Class 7 of all such goods.—Grimston Electric Tools, Ltd., Progress Way, Purley Way, Croydon, Surrey.

No. 671,606 (design). Class 9. Electrical apparatus and instruments included in Class 9; and scientific, optical, photographic, measuring and signalling apparatus and instruments.—The Evans Electrical Co. (Lowestoft), Ltd., 41, Alexandra Road, Lowestoft.

VANGUARD. No. 672,351. Class 9. Combined electrical switch and fuse gear.—C. H. Parsons, Ltd., Britannia Works, Wharfdale Road, Tyseley, Birmingham, 11.